HINTS ON HOUSE-PAINTING;

OR,

PAINTS & COLORS,

AND

HOW TO USE THEM.

J. W. MASURY.

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BY

J. W. MASURY.

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PAINTS, AND HOW TO USE THEM.

CHAPTER I.

INTRODUCTORY.

THERE is nothing in domestic, or out-door life, so common, so constantly before our eyes, as painted surfaces; yet, outside the ranks of those who profess the art of painting, there prevails a general ignorance of the nature and composition of paints, and of the proper and economical use of the same.

Owing to what the writer must call a defect in our system of education, not only in our common schools, but in the higher institutions of learning, no effort is made to educate the perceptive faculties in the discrimination of colors, or in their harmonious combination and arrangement. Such teaching is certainly worthy the attention of those to whom we commit the instruction of our children, and the neglect of it is a national misfortune.

Hoping to create an interest in this important subject, the writer is induced to offer this little book to the public, and would modestly commend it not only to the trade, but also to the general reader, with the belief that there are but few who may not find some instruction in its pages.

A knowledge of the materials employed in the prosecution of any trade, profession, or calling, their source, origin, nature, effects, and properties, and the mode and manner in which they are influenced by the invisible forces of nature, ever active in the great law of change, would seem to be a necessary concomitant of success.

The materials used by the painter and colorist are more directly the result of chemical research and discovery, than are those of

other trades and callings; and no amount of observation and study, without the assistance of written explanations, will give the clue to their composition and mode of production. The wood which the carpenter fashions into shapes of utility and beauty, bears in its grain the story of its growth. The nails which he uses are familiar as household words, and of themselves suggest the mechanical force which fashioned them. But the materials which reflect to the eye the thousand tints and colors which the painter disposes with cunning hand, give no sign of the secrets of their origin. They may be simple or compound substances—wrought out in Nature's vast laboratory, or the result of the highest scientific skill.

The aim of the writer has been to give, in as brief a form as possible, the mode of operation in the production of the factitious pigments used in house painting, and to explain the origin and properties of those which are of Nature's own production.

If house painting consisted of merely covering the wood-work of a dwelling with one or more coats of white paint, to speak of it as "Fine Art" would hardly be justifiable; but so far is such from being the case, that to conduct successfully, the business of painting in our cities and larger towns, requires the exercise of those faculties which, in general acceptation, are supposed to distinguish the artist from the mechanic. An eye prompt by nature and education to distinguish the nice gradations of colors and tints—and the faculty so to arrange and dispose them as shall best harmonize them with each other, and with the surroundings—are indispensable requisites in the house painter of the present day.

Happily, the day of dead whites for the interiors of our dwellings has passed by—let us hope not to return. It was a kind of Puritanism in painting, for which there was no warrant in Nature, which, in such matters, should be our Teacher and Guide. If we go to her humbly, as little children, for instruction, she will point us to the vaulted arch above, frescoed by day with a thousand shapes and hues of beauty and loveliness, and by night with myriads of stars: to the cool gray tints of the morning twilight, and the gorgeous blazonings of the summer sunset. She will show us a

landscape whereon, with a lavish hand, she has painted forms of beauty of every color, and tint, and hue, and shade, and penciled with exquisite touches the tiniest leaf. But the subject must not be considered only in its æsthetic aspect; not alone as adding beauty and comeliness to our houses, but in its economical aspect, as most important in preserving wood from the action of the weather, in excluding dampness, and arresting moldiness and decay. It is, too, highly promotive of that "cleanliness which is next to Godliness," and affords the best outward sign of the advance of a people in the path of civilization: for just in proportion as the houses, fences, and out-buildings of a community are painted or neglected will be the advance of that people in wealth, literature, home comforts—in short, all the consequences and refining influences of a high civilization. That this is true, of our own country at least, appeal is made to those who have traveled much and have thereby acquired the experience necessary to the forming of a correct conclusion. Indeed, one feels as he leaves behind him the freshly painted houses and lattice fences of the older and more thrifty portions of our land, and finds himself surrounded by the evidences of a ruder cultivation, that this condition is owing in a greater or less degree to the absence of the house painter and his stock of paints.

The business of house painting has so outgrown its former insignificant proportions, that its past and present features have almost lost their resemblance. To-day, more money is expended in the painting of a single edifice than would have sufficed to paint every house in a respectable sized town thirty years ago; and the amount of capital, skill, and intelligence now required to conduct the business successfully in the cities and large towns, was not dreamed of at that time. The services of the painter are better acknowledged and appreciated, and his labor more adequately rewarded, than formerly. The business tact, knowledge, skill, and capital of employers, in many cases, meet with ample but deserved remuneration—for the business seems to be attended with more than its fair share of the vexations and annoyances which, to a greater or less degree, appertain to all the various branches of the mechanic arts.

One of the most serious difficulties with which the employing painter contends, is that of obtaining the services of skillful, reliable workmen during what is called the busy season. This grows out of the fact, partly, that a large proportion of re-painting, interiors particularly, is crowded into the brief season of spring, and partly from the idea that once generally prevailed, and which, unfortunately, obtains now to some extent, that anybody can do plain painting, and that the art of mixing and laying on of colors requires less skill, and is more easily acquired than skill and dexterity in other trades. During this brief busy season, the employer, under the pressure of necessity, avails himself of such workmen as present themselves—some of them, perhaps, fresh from the lapstone and the last, who have stepped from the shoemaker's bench to the paint brush as if the same were a natural and proper transition.

The elements, too, conspire against the painter. A sudden shower will sometimes produce a most undesirable commingling of tints, blending black, white, and gray in streaky confusion. The dust plague, too, is ofttimes a double plague to him. A change of temperature may check the drying disposition of his pigments—for the property of absorbing oxygen, which the oil possesses at ordinary temperatures, seems to be wanting under certain atmospheric conditions.

Clamorous housekeepers exact promises which are made for the sake of peace, too often, alas, only to be broken. The disordered condition of the household, extended far beyond the stipulated time, is added to his unavoidable sins of omission, and many a brave boss has beaten a hasty and inglorious retreat, rather than meet the unmerited rebuke of an angry and disappointed housekeeper. But there is one drop of comfort which the painter shares, not in common with other craftsmen: his coming always gives satisfaction and meets a ready welcome, and the doors close behind him, when his work is completed, with intensified delight.

Formerly a slab and muller were indispensable articles in the furniture of the paint shop. These have been, in a great measure, superseded by the iron paint mill, and the latter, in some degree, by the introduction of ground colors put up in tin boxes (commonly called "*cans*") of convenient size. These boxes, after the manner

of fruit cans, are sealed by soldering a patch, or disc, of tin over the opening through which the contents were introduced, and being hermetically closed, the paint remains unchanged until such time as it may be wanted for use.

The objection, formerly, to this mode of putting up colors, was the difficulty of opening the cans, particularly the smaller ones. This has, however, been entirely removed by an invention, which is patented, and which most effectually overcomes the difficulty before mentioned. It consists simply in making one end of the can of thinner metal than the body and bulk of the same, so that the said end may be cut out with a penknife. To get at the contents requires but an instant of time, and may be effected without waste of material, or even soiling the fingers.

For interiors of the best class of houses and public buildings, what is called Fresco Painting is now the fashion. This is, properly, only an *imitation* of fresco painting, which term, in its proper sense, signifies, a method of ornamenting the walls and ceilings of buildings with colors ground in water, and mixed with lime and applied to freshly laid plaster. True fresco painting was practiced by the ancient Greeks, and by other nations of antiquity; and all who have traveled in Italy are familiar with the magnificent frescoes which adorn the walls and ceilings of so many churches, convents, and palaces there. After the middle of the seventeenth century, this art rapidly deteriorated. The present century has however witnessed its revival, and it is now practiced

to a considerable extent, particularly in Germany. With us what is called fresco painting is simply the painting of walls and ceilings either in oil or water colors, and ornamenting the same with panels, molding, flowers, or other designs. The wood-work in so-called frescoed rooms, is painted in what are called parti-colors (neutral tints generally), to harmonize with the colors on the walls and ceilings. This style of interior decoration affords a fine field for the display of taste and true artistic skill; consequently, house painting nowadays, comprehends something more than the mere mechanical operation of covering the wood-work of a house with a coat of plain white, or lead-colored paint.

CHAPTER II.

TRUE ECONOMY IN THE USE OF PAINTS.

The fact can not be too forcibly impressed on the minds of all who may be engaged in the business of painting, that *good results can be produced only by the use of good materials. The best are always the cheapest.* The main expense in painting is not in the cost of the paint, but in that of *labor* and oil; and it requires more labor to apply the *worst*, than to apply the *best* paint that can be obtained. The cheapening of paints by the admixture of adulterating materials, is carried on to the last degree—probably to a greater extent than in any other article of general use and consumption.

The *experienced* eye can with difficulty detect the difference between colors which are pure and those which are highly adulterated, the only test being actual *use* and *application*. The safe way, therefore, is to purchase such colors *only* as bear the name of some well known and responsible manufacturer.

The writer would not, however, be understood as advising the use of the best white-lead or zinc for *all* kinds of painting: there are paints much more economical, because more durable, for outside work than these. The ochres, or earth-paints, are, for many purposes, the best and cheapest. Paints are durable, mainly, because of the water-proof quality of the oil in which they are used. Some paints, the ochres for instance, are inert substances, and do not in any degree change the nature of the oil; while others, such as white-lead, affect the oil chemically, and impair, in a measure, its tenacity—its property of resisting the action of water and the sun's rays.

Much of outside wood-work is painted simply to preserve it from the action of the weather, color and appearance being, in such cases, unimportant considerations. Hence, it follows that

whatever material will most economically produce this result, is the most desirable, regardless of the name it may bear.

The natural deposits of ochres (colored earths) belong to what is known in geologic nomenclature as the Jurassic period.

The time when these deposits occurred is a matter of pure speculation, and may as well be supposed to have taken place five hundred thousand years ago, as at any period more or less remote. As has been before remarked, had these materials been liable to change, it is only reasonable to suppose that such change would have occurred during the ages that they remained unappropriated to the use of man; and experience teaches that they are *not* subject to those changes which belong to most of the artificial products used in painting.

Hence the value of these native pigments. Economically considered, they are undoubtedly the most valuable of all the paints, where primary or prismatic colors are not absolutely required. The only change they are liable to, is a change of place. They may be, and are, of course, wasted by the slow disintegration of the coating which they form with the oil, but in color (when unmixed with white), they are inflexibly permanent, and stand exposure to the sunlight without fading or bleaching in the slightest degree. Nor are they affected by the action of acids and gases, as are most of the artificial paints.

Now that the day of whites and light tints is passing away, and a better taste in decorative ornamentation is about to prevail, it becomes all those engaged in the business of painting, to consider to what extent these natural pigments may be made to take the place of the artificial compounds which have heretofore been considered indispensable, and for which it has been supposed impossible to find substitutes.

It must be remembered that the native pigments are in inexhaustible supply, that they are of almost universal distribution, and that they are not known to possess any value except for the purposes of painting; nor is the production and preparation of them supposed to affect the health of the workmen engaged in it unfavorably. So far, therefore, as they can be substituted for those paints, the production of which lessens the stock of useful

metals, the use of them adds directly to the wealth of the country and of the world. Their application is strongly recommended whenever they can be made to take the place of the more expensive metallic substances as "TRUE ECONOMY IN THE USE OF PAINTS."

"*A stitch in time saves nine*," is a somewhat trite saying, but nevertheless, well worthy of consideration, and in nothing connected with building has it more significance, than in the matter of *Tin Roofs*.

For a *flat* roof, tin is, beyond question, the most economical covering that can be applied. If not *neglected*, it is absolutely indestructible by external influences, and will last a hundred years in as good condition as when first laid on, *if kept well painted*! yet there are to-day in the city of New York, thousands of roofs undergoing the process of slow corrosion and decay, because of the want of a little timely attention. The comfort of the household and safety of the property, depend in a good measure on the quality and condition of the roof; yet there are hundreds of thousands of dollars wasted every year, by the most inexcusable negligence in this matter. Many owners of valuable houses never visit the roofs, and, until admonished by the appearance of stained ceilings and discolored walls, pay no attention to this important subject. The renewing of a tin roof is attended with a considerable outlay of money, and no small amount of inconvenience and trouble. A rain storm, during the process, may involve the ruin of hundreds of dollars' worth of expensive and cherished household goods. To avoid this, in many cases, some nostrum-vender, who advertises to "*cure* leaky roofs for a small consideration," is allowed to cover the neglected housetop with a coating of tar and sand, *warranted* to remain tight for five years. This temporary expedient, however, like most temporizing, proves a costly experiment, and time soon shows the second state of that roof to be worse than the first; for such neglect there is but one remedy, repentance, a new roof covering, and a promise of better attention in the future. *Tin on a housetop* should be well *painted once in four years*.

For roofs, *light, cool colors* are preferable, because they reflect the warm rays of light, and thereby lessen the expansion and con-

traction of the metal, and the shrinking of the boards underneath, and so, lessen the liability of the tin to crack in the seams. The temperature of attic rooms in summer will be materially lower, if the roof be painted with a light rather than with a dark color.

The writer has learned from long experience, that the finest yellow ochre is the most economical pigment that can be used for that purpose. If, as is sometimes the case in country houses where the roof is a conspicuous object in the architecture of the building, a dark color be indispensable, the use of pure Venetian red, darkened with lamp-black, is recommended as the most desirable and economical. If, by some process the oil used in roof painting could be prevented from becoming hard and brittle, it would be a great gain.

The poorest oil paint, however, is better than neglect; and the best economy consists in keeping tin entirely and thoroughly protected from the corroding influence of dampness. Old paint which has become "fatty" from exposure to the atmosphere, is better than new, for roof painting. Not a drop of turpentine should be used for such work.

It may interest the general reader to know that unsophisticated pigments are the exception, and not the rule: that hundreds of tons of so called white-lead are annually sold in the United States, wherein the highest chemical skill would be unable to detect a grain of the material under the name of which this fictitious article is sold.

This is not adulterated white-lead, but an *imitation* of white-lead, and so close is the resemblance that the eye is not able to detect which is the genuine and which the false.

"RAILROAD PAINTS AND COLORS."

These paints are designed to supply a want which has long been acknowledged—which is, cheap, reliable, ready-made colors for painting the exteriors of country houses, fences, out-buildings, roofs, &c. They are the result of a series of experiments and tests extending over many years, and are confidently recom-

mended as possessing all the required qualities for preserving wood, iron, stone, tin and plaster from the action of the weather.

They are warranted more water-proof than any paint ever before offered, and are fire-proof to as great a degree as any paint now in use. Being ground in oil perfectly fine, they work smoothly and easily under the brush, possess a density and covering property unequaled by other substances used in painting, and can be applied by those not skilled in the use of the paint brush, without any mixing or manipulation other than being thinned with oil, benzine, or turpentine, to suit the work.

For painting freight cars, wood and iron bridges, iron buildings, tin or iron roofs, warehouses, store-houses, out-buildings and fences, or exterior work of any description, the Railroad Paints will be found superior in every respect to any paint ever applied.

They are of various colors, as Stone Color, Brown, Iron-Brown, Red, Dark Drab, Light Drab, Dark Yellow, Light Yellow, Blue, Green, Olive, &c., and are further distinguished by the prefix of "Railroad"—which we claim as our special trade mark—and by the affix of numbers, as Railroad Iron-Brown No. 10, and so on. It will be seen elsewhere that the writer strongly recommends the use of the ochres and earth-paints, wherever they can be made to take the place of the more expensive artificial products of lead and zinc.

The Railroad Paints being mostly natural colors, are not liable to change or fade, as are most factitious pigments; and a given quantity of the former will cover a much larger area of surface than will the same quantity of white-lead, while the first cost is only from one-half to two-thirds as much.

Samples of the shades and colors of the Railroad Paints on painted paper, with prices, will be sent by mail, upon application accompanied by stamps to pay return postage.

The paints are put up in barrels, half-barrels, and in 100-lbs. kegs, ready for use when thinned with raw or boiled linseed oil, or turpentine, or benzine, as may be required to suit the work.

Many of the materials sold under various names, and recommended for painting, are in their nature totally unsuited for such

purpose, being semi-transparent, and consequently wanting the property without which no pigment is valuable or economical, for ordinary exterior house painting. They are, too, coarse, gritty and sandy, which renders the spreading of them evenly a task not easy of accomplishment. In hue and tone of color they are disagreeable and unpleasant. A dingy chocolate-colored exterior is not in harmony with *any* landscape. No matter what the character of the structure may be—whether it be isolated or attached to other buildings—whether it be a corn-crib or a cow-house—if the same be worth painting at all, it is worth painting with some regard for the laws of harmony and the "fitness of things."

Every house, barn, out-building, or fence, becomes, when painted, a more conspicuous object in the landscape than it otherwise would be; and the cost of painting the same in conformity with the laws of harmonious arrangement and proper adaptation to the surroundings, is no greater than to paint in such a manner as to set all these laws at defiance.

For example—the surroundings of most country houses reflect to the eye the various hues of green. Now, red-brown and green in juxtaposition produce horrible discord. A yellow, partaking of the orange hue, on the contrary, makes agreeable harmony. Red-browns and chocolate colors are altogether unsuited to the painting of country houses. They are out of place in a landscape, and can not be made to harmonize with the surroundings. Some tone of yellow is preferable, particularly where the house has green blinds attached to the windows. It is not good taste, however, to use white for the trimmings—window frames cornices, &c.—with yellow. White and yellow are poor and feeble, and are wanting by analogy; the yellow loses by the connection. A rich shade of brown (not red-brown) is proper for trimmings in contrast with yellow, and makes very pleasing harmony. Bright green blinds also are more agreeable with yellow, than with any other color which would be suitable for painting the exterior of a country house. Next to yellow, the yellow drabs and stone colors are recommended.

No rule can be given which will serve as a guide in such mat-

ters, for the reason that what might be very proper and suitable under certain conditions, would be unsuitable and improper under other circumstances; and it is far more easy to point out what to avoid than what to adopt. Where buildings are grouped, yet not connected, a very good effect may be produced by painting the smaller ones of a darker shade of the same hue as the principal, or prominent building. Uniformity in such cases is by no means desirable, except where the object is to hide or diminish the lesser structures. As a rule, very dark colors are to be avoided in painting the exterior surfaces of wooden houses, not only because such colors are less in harmony with the surroundings, but for the reason that such colors do not preserve the wood so well as lighter tints, and so are objectionable on the score of economy.

The painting of a building, however poor and mean the structure, affords some opportunity for a display of taste; and, as has been before remarked, the humblest individual may manifest an innate perception of the beautiful in the ornamentation of a cottage, and in the poorest materials.

A man may perform the mechanical part in the operation of painting faultlessly, and yet be entirely wanting in the faculty to arrange and dispose colors in harmonious combination.

Those to whom we intrust such work should possess the natural gift of discriminating colors, educated by good examples, and be thoroughly imbued with love for the art.

NOTE.—When yellow is mentioned in the foregoing chapter it must not be understood as signifying the *yellow of chrome*, but strictly, some tone of drab in which yellow is plainly perceptible if not predominant. All such tones of color are called by the general name of yellow.

CHAPTER III.

PREPARATION OF COLORS.

THE art of preparing colors for the use of the painter, is one which requires a thorough practical knowledge of the nature and composition of the various pigments, and skill in the selection of the same, as well as an entire familiarity with the different degrees of fineness which the colors may require to fit them for the purposes to which they may be applied. Some paints lose their brilliancy and beauty by too much crushing and grinding, and become dull, pale, and comparatively worthless, while others require grinding to the last degree of fineness, to develop the color which is in them. Notwithstanding these facts, which are known to every painter who has been properly educated in his profession, the business of preparing colors for his use is, to a great extent, in the hands of persons entirely ignorant of the nature of paints and the requirements of the painter.

Active and ever increasing competition has begotten a strife, not as to who shall produce the best possible paints, but as to who shall put upon the market the worst article which can, by any stretch of fancy, be called a "ground color." This evil has, however, like most others, worked out (or is in process of working) its own cure. Experience is teaching the lesson, where it has not already been learned, that "cheap paint," that is, paint made to sell at a low figure by means of extreme adulteration, is "dear at any price." This rule, however, is not of universal application, but is intended to apply to painters, mostly, who have the means and knowledge required to avoid the waste of good material.

There are many cases where a small quantity of color is required to produce a certain tint, and colors can not always be obtained in such small quantities as may be desired. In such cases, it would be advisable to buy a cheap article and consume it all, rather than

to buy the best and suffer a large portion of it to be wasted. It must be borne in mind by the painter, that in cheapening paints by the admixture of adulterating materials, the reduction must be made wholly in that portion of the mixture which possesses the coloring property he requires. There can be no corresponding cheapening of *all* the materials. The oil, the labor, and packages cost as much for the poorest as for the best colors; therefore, a color which sells at twenty cents per pound may possess, really, three times as much intrinsic value as one which sells at one-half that price. There can be no better rule for a painter to adopt, than to *buy always the best colors*, and in *packages as large* as the requirements of his trade will justify, with a view to strict economy and the prevention of waste.

CHAPTER IV.

WHITE PIGMENTS.

The only white pigments used in house painting that are of sufficient importance to notice in this place, are the *Carbonate of Lead* (white-lead) and the *White Oxide of Zinc.* In the detailed description which follows of the method of producing these two most important articles, the writer has endeavored to avoid as much as possible the use of technical terms, and has confined himself to such only as shall set forth in the clearest manner possible, to those who may be unacquainted with scientific signs, the mode of operation. The use of white-lead in oil painting is of very ancient origin, while the use of white oxide of zinc is comparatively of recent date. One of these two, at the present day, forms the staple of all the neutral tints used by painters, and enters more or less into all the shades of the positive colors, as green, red, blue yellow, &c. They are more extensively used by themselves, that is, without tinting, than other paints, and are, consequently, of the first importance. The comparative value of these two materials, the properties they possess to resist the action of the weather, and the many gases to which they are under nearly all circumstances exposed, and, most important of all, their merits or demerits in an economical point of view, open a wide field of discussion. In entering this field the writer promises to set forth, as clearly and impartially as possible, what he believes to be the facts in the case. His views are the result of an experience of more than twenty-five years in the business of preparing paints and colors for painters' use, and he has had unusually good opportunities of comparing the opinions of painters from various and widely separated parts of the country, many of them men of large experience, whose views are entitled to consideration.

Keeping in view the fact that painting is done, not so much to

preserve as to beautify our dwellings, and to make them cleanly and easy to be kept clean, and that whiteness is an indispensable requisite—as clear, pure tints can not be produced without a pure white—the ready conclusion would be that any white paint which would most readily and economically realize these results, would be adopted without question. That white-lead possesses a density, opacity, body, covering property, superior to zinc, will not be questioned. (White-lead, ground without any admixture of adulterating materials, of course, is meant.) To account for this, we need go no further than to the fact that a given weight of white-lead, in its dry state, requires less than half the quantity of oil to wet it that would be necessary to wet the same quantity of zinc. White paint derives, in a great measure, its value from its covering qualities; that is, the property of opacity; its quality of rendering soiled, dirty, stained, discolored wood-work or walls solidly white; of producing a clear, white surface, covering up and rendering invisible whatever may have been before unsightly. That this result may be obtained more certainly with lead than with zinc there can hardly be a question; but there is a second very important consideration, which is, the comparative durability of the two materials. The painted work inside a house requires constant wiping and washing to keep it clean; hence it follows, other things being equal, that the paint which adheres most tenaciously to the wood, which resists most successfully the constant and repeated washing to which inside work must more or less be exposed, is the most economical and most desirable. Zinc paint is more water-proof than lead; that is, the application of water and soap to the outward surface of a coating of zinc does not impair its durability to the same degree that it does lead paint. The particles of lead do not have any cohesiveness, except what the oil gives them; and that cohesiveness being removed, by the action of water or the sun's rays, they fall off from the wood. On the contrary, the particles of zinc seem to depend on each other to form a continuous coating; they seem to overlay, to lap on in such a way as to prevent the water from working around or behind them. All who have taken notice are aware of the fact that outside work, covered with the very best white-lead paint,

becomes in a short time chalky, and the paint rubs off on the hand or clothes, when brought in contact with it, especially in sunny exposures. The reason of this is that the sun, acting with the lead, destroys the water-proof properties of the oil, and the paint becomes as whitewash, liable to be removed by the rain and storms. ZINC, from this property of cohesiveness which it possesses, is not so soon affected by the action of the sun and rain. It forms a smoother, harder surface, and, shedding the water more perfectly, resists its action for a greater length of time. Yet for this very reason zinc is unsuited for use in situations exposed to much dampness, for though it does not, like white-lead, crumble away and fall off, particle after particle, it does scale, or flake, and falls from the wood in shelly masses, leaving the surface of the work as entirely free from covering as if it had not been painted. This occurs, however, only in situations where it is exposed to much dampness. Where zinc is employed, it is not recommended for a first coating, but white-lead for the first application and zinc for the succeeding coats, particularly the finishing one. As to the question of comparative expense in the use of these materials, there is not much to be said; possibly there is a slight difference in favor of zinc, but it is inconsiderable.

CHAPTER V.

WHITE-LEAD, ITS MODE OF PRODUCTION, ETC.

UNTIL within the present century, the manufacture of white-lead was confined principally to Holland, and what is known as the *Dutch* process is *now* the mode of operation in its production in most of the lead works of Europe and America. As before stated, until within a few years, carbonate of lead was the only white paint in use, for painting the wood-work and walls of houses. It preserves its whiteness well when mixed with oil, works smoothly and easily under the brush, and gives a uniform coating to wood, plaster, or stone. Under some of its various names, as silver-white, flake-white, krems-white, or china-white, it is the most important pigment on the palette of the artist, and forms, with zinc, the staple in the stock of the house painter. Although some improvements have been made in the manufacture of this article, it remains the same in all its essential features as when first described in print. Hundreds of so-called improvements have been made, and innumerable patents have been issued for inventions whereby the loss of time, consequent upon the production of white-lead by the old process, was to be avoided, and the cost of manufacture lessened; or some other oxide of lead was to be the substitute for the carbonate. *So* far, none of them have to any appreciable extent lessened the demand for white-lead, or brought it into disfavor in the slightest degree. Millions of dollars have been wasted in the attempt to find a preparation of lead which should take the place of the carbonate, as produced by the Dutch process. White-lead is produced simply by exposing thin sheets or shapes of blue lead to the fumes of vinegar. The metallic lead is melted in iron kettles, and run into molds or shapes called buckles. These buckles are about the circumference of small tea-plates and have

the appearance, in form, somewhat, of large round shoe-buckles; the object being to expose as much of the surface of the metal as possible to the action of the vinegar. These buckles are placed in earthern pots (glazed on the inside), of uniform size, holding each about three pints, along with a quantity of whisky or molasses vinegar, or other acetic acid. Thus charged, the pots are placed in a bed of spent tan-bark (the refuse of the tan-yard) to the number of twelve thousand more or less, according to convenience. The first layer of pots is covered with boards on which is placed another and thinner layer of tan, and again a layer of pots, and so on, alternate layers of tan and pots, until the *stack*, as it is called, is completed. On the top of all is placed a thick layer of tan, and the process of converting the metal into white-lead may be said to have commenced. In a longer or shorter time, according to circumstances, the tan generates sufficient heat to vaporize the acid, which, coming in contact with the metal, changes the same by a mysterious chemical process into a white brittle substance, which, with crushing and grinding, becomes the beautiful white pigment with which all are familiar under the name of white-lead. The process of disintegration and conversion goes on for many days, and at the end of eight or ten weeks, more or less, the stack is ready to be taken down. On uncovering the pots they will be found to contain no acid, and the buckles will be found to have increased materially in thickness and bulk and weight. In that unsightly and apparently inert mass of tan and boards has been going on, silently and secretly, hour after hour, day after day, and week after week, during the lone watches of the night, and the bright glare of noonday, one of the most beautiful and interesting processes of nature. The acid, at first cold and inactive, warmed into life by the self-generated heat of the surrounding mass, has attacked the tough and ductile metal, destroying its metallic structure, forming a new combination into which it enters as one of the component parts, adding weight and bulk to the already heavy substance, and bringing forth a material which, to the eye, offers no sign of the secret of its birth. During the process the tan will have lost its power of generating heat, the acid will have been resolved into its original elements, and the buckles with their added weight

remain to repay the cost of expended labor and material. These buckles when taken from the pots are found to be incrusted, to a greater or less extent (in some cases perfect corrosion has taken place), with a white brittle coating amounting, say, to two-thirds or three-fourths by weight of the buckles when first placed in the pots. This incrustation is removed by pounding in a machine prepared for the purpose, and that portion of blue lead which shall remain is returned to the melting pots to be again cast into buckles, and again submitted to the action of vinegar and heat. The crust, which is now the carbonate of lead, composed of about ninety parts of metal with ten parts of carbonic acid, is thoroughly washed to free it from stains arising from whatever cause, and then crushed and ground in water between heavy mill-stones into a fine pasty mass, which is conveyed to a stack or series of steam-tight hollow pans placed one above the other, the upper surfaces of which are composed of sheets of copper riveted together to form continuous plates. Into the hollow of these pans the exhausted steam from the engine is introduced, and the white-lead is thoroughly dried. It has now become the dry white lead of commerce, and is ready to be made into paint simply by mixing with linseed oil in the proportion of about nine pounds of oil to one hundred pounds of lead, and again grinding in heavy stone mills. The production for the United States for the year 1867 is estimated at about fourteen thousand tons; more than half of which was produced by the different manufactories in the city of Brooklyn. The objections to the use of white-lead as a paint are worthy of consideration, though not by any means so formidable as most persons suppose. The main objection is the poisonous property of the article, and its consequent deleterious effects upon the health. The second, its liability to become discolored by the action of certain gases, which are common in and about every dwelling. The first objection was in former times of great importance but now has lost, nearly, if not wholly, its force. In *those* times, the rudimentary part of the education of a painter's apprentice in the mysteries of the craft, was the mixing of dry white-lead with oil in a tub or keg, and then grinding the same in a mill with hand-power. This work was usually performed during the winter months in close,

warm rooms, and more or less of the particles of dry lead found their way into the system by inhalation.

The effect was seen in the fair complexions and decayed teeth of most of those who followed the trade, and not a few cases of painter's colic occurred, some of which proved fatal. In these times, we have changed all that. Now, steam does the unwholesome drudgery, and gives to the painter's apprentice better occupation for his winter hours than the rudimentary crank-work, which, to say the least of it, was not a highly intellectual occupation, nor one calculated to lead the soul to longings after the ideal.

Now, the white-lead comes to the hands of the workman locked up, so to speak, in indissoluble bonds, every particle of it inclosed and incased with a water-proof substance, and no more deleterious to health than would be the same quantity of flour paste. It has been pronounced by learned and scientific men, doctors, and professors, to be unwholesome to sleep in a freshly painted apartment, or to inhale the air of a room newly painted. The ground for such a theory is, of course, the supposition that there are floating in the atmosphere particles of white-lead in sufficient quantity to injure the health, the same finding their way into the system by inhalation or absorption. In the opinion of the writer, it would take as long to poison a man with the particles of white-lead which float in the atmosphere of a freshly painted house, as to cause an attack of gravel by inhaling the particles of a grindstone which fly off with the water which evaporates from its surface. Indeed, it is contended that not the minutest particle of white-lead passes off from the surface of newly painted wood-work during the chemical operation of the drying of the paint. To say that people are made sick or nauseated by the smell of fresh paint, is no more an argument in favor of the theory of its being poisonous, than that the odor of onions, which is disgusting to many, is proof of the unwholesomeness of that pungent and highly nutritious vegetable.

White-lead is not recommended for iron work when the object is to preserve the metal from the corrosive action of oxygen. It may be truly said, that there is no pigment in common use (the copper greens excepted), which does not afford a better protection than pure white-lead. Most oil paints are simple mechanical

mixtures, and the pigments are not supposed to exert any chemical action on the oil in which they are mixed; but the oxygen in white-lead is supposed to combine with part of the oil, and thereby form true plaster or metallic soap. This chemical change may account for the well-known fact, that pure white-lead is the least durable of any known pigment. When a white surface is indispensable, zinc is far preferable to lead for painting iron.

Masury & Whiton's warranted strictly pure white-lead is ground in refined oil from the best English dry lead, and will be found equal in whiteness and body to any lead in use. We put up also other brands of lead, of various qualities, to suit the market as to price.

CHAPTER VI.

WHITE OXIDE OF ZINC.

This pigment, which ranks next in importance to white-lead in the list of paints, consists of thirty-two parts of the metal zinc and eight parts of oxygen. In its dry state it is a beautiful white, soft, feathery substance, and has long been known and used for medicinal purposes, under the name of flowers of zinc. It mixes readily with oil, but does not work so freely under the brush as white-lead, and requires rather more skill in its manipulation to produce a smooth and even surface. It is entirely free from objections in a sanitary point of view, and is not known to affect deleteriously the health of the workmen engaged in its production in the slightest degree. This pigment is produced by reducing the ores of zinc in oven-shaped furnaces, having perforated cast-iron floors, and openings in the top for the escape of the zinc and the gases of combustion. A fire of anthracite coal is made all over the floor of the furnace, and a blast of cold air is driven through the same. The ores, crushed to the size of coarse sand and mixed with fine coal, are spread on the fire, and when raised to 2,000 degrees Fahrenheit, are de-oxydized—the oxygen of the ore, uniting with the coal, forming carbonic acid gas—the zinc rising as a metallic vapor. The vapor and gases are sucked from the furnace, and conveyed through iron pipes to a large room, into which they are driven, and out of which the gases escape. This room is filled with large, stout bags, suspended open-mouthed, to catch the zinc, which, in its passage from the furnace to the bags, goes through chambers into which air is admitted. In its vaporous form it unites with the oxygen of the atmosphere, forming the light flaky substance known as flowers of zinc. The oxide at this stage is extremely light, thirty or forty pounds of the same being sufficient to fill a barrel. It is

then compressed to about one-fourth of its former bulk, and packed in barrels of two hundred or casks of four hundred pounds, and sold to manufacturers, whose business it is to prepare the same by mixing and grinding in oil for the use of the painter.

White zinc was formerly largely, and is now to some extent, imported from France and Belgium. The rapid improvement in the manufacture of it in this country has, however, to a great extent, driven the foreign zinc from the market. There are several establishments in this country for the manufacture of white oxide of zinc, the principal ones being the New Jersey Zinc Co. at Newark, N. J., who manufacture mostly from the ore known as red oxide; the Lehigh Zinc Company, at Bethlehem, Pa., who use the ores known as carbonates and silicates; and the Passaic Mining and Manufacturing Company, who use the red oxides, as also the carbonates and silicates. The total production of zinc paint by the different manufactories in the United States during the past year (1867) was seven thousand five hundred tons.

Masury & Whiton's pure Parlor Zinc.

This paint, for all situations where zinc is desirable in place of lead, will be found superior in body and fineness. We confidently recommend it to the trade.

We put up various grades of zinc, to suit the market as to price.

CHAPTER VII.

BLACK PIGMENTS.

Lamp Black, *Drop Black*, *Ivory Black*, *Bone Black*, *Frankfort Black*, are the names applied to the simple substance which affords all the blacks used in painting and in the manufacture of printers' ink, viz.: *Carbon*. Lamp-black, the most important and useful form of carbon to be considered here, is produced from the article known in trade as common rosin, or other bituminous substances. The finer kinds are made from rosin, and the common kinds from coal or gas tar.

All resinous, oily, fatty substances produce lamp-black in the process of burning, it being simply the soot resulting from highly combustible bodies as they are imperfectly consumed. Every smoking lamp is a lamp-black manufactory in miniature. Being nearly pure carbon, it is one of the most unchangeable substances known—absolutely indestructible under all ordinary influences. Acids, alkalies, and gases, which powerfully and rapidly affect most other forms of matter, have generally no effect on this.

The most powerful sunlight can not bleach or destroy it, or change its form or character. Through all the changes of times and seasons—the winter's cold and summer's heat—it remains the same. Except in combination with oxygen, it is unchanged by heat; and in some of its forms, a furnace fire which will melt steel as wax, causing it to flow like water, does not produce the slightest perceptible effect on this simple substance.

A very good idea of its permanent character, when used as a paint, may be had by observing the old sign boards at toll-gates and toll-bridges. Exposure for many years to sunshine and storms, has, in most cases, not only removed the surrounding white lead paint which originally covered the wood, and on which the letters

were traced, but the wood itself will have yielded to atmospheric influences, and fallen away by slow disintegration, leaving the characters which signify the directions, rates of toll, &c., raised above the surrounding surface, like the letters used by blind persons in learning to read. The carbon used in painting the letters has remained, through all, the same, bidding defiance to the tooth of Time himself. This property is shown also, in a more striking degree, perhaps, by the writings found at Herculaneum, which have retained their original blackness for more than two thousand years. In remote former periods, this property was known and appreciated, and the ancients seem to have availed themselves of it on all important occasions.

It would be a great mistake, however, to suppose that all the black paint sold and used is pure carbon. On the contrary, all that used in ship painting, and known as common black paint, is very extensively cheapened by adulteration. So far, indeed, is this process carried, that common black paint is mostly composed of some cheap earthy substance, blackened by the addition of a small percentage of lamp-black. The extensive use of this worthless material, affords another instance of the want of economy manifested in painting. The actual first cost of painting a vessel with pure carbon black, is much less than painting with the cheap adulterated material in common use, to say nothing of the saving in labor, which is a most important consideration. While, in the one case, the paint retains its blackness and adheres tenaciously to the wood, in the other it turns gray after a brief exposure, and needs frequent renewals.

The test of the purity of black paint is its weight in proportion to its bulk; a can or keg which will contain twenty-five pounds of common black paint will contain but ten pounds of pure carbon black. One pound of pure black will cover as much surface as three pounds of common black, at a proportionately much less expenditure of labor. Notwithstanding these facts, it would be difficult, if not impossible, to obtain in any chandlery in the city of New York, where ship paints are sold, a keg of pure black paint.

In ship painting as in house painting, good results can be pro-

duced only by the use of good material. *The best are always the cheapest.*

The article next in importance is Ivory or Bone Black (animal charcoal), known also as Drop Black and Patent Black. This is made by first calcining bones, or ivory chips and turnings, in a close retort, and afterward powdering the charcoal and grinding it in water between heavy mill-stones.

To render it more entirely black, and give opacity, a portion of prussiate of iron is added. After being thoroughly dried in the form of drops or cakes, it is again powdered and again ground —in oil. This black is used mostly in coach and carriage work.

Frankfort Black is produced by calcining vine branches and twigs and other lees of the vinegar vats in Germany. It is of no particular importance to the house painter, but is used to some extent in painting in water colors.

Pure Carbon Black

manufactured by Masury & Whiton, New York. This is confidently recommended to house, ship, and sign painters as the most economical article ever offered. It is ground in drying oil, and put up in cans of twenty pounds each for painters' use; and though nominally higher in price than the common adulterated black paints, it will prove practically much cheaper, a single pound of it only being required to cover a painted surface of sixteen square yards of wood-work.

Coach Painters' Drop Black.

This black is prepared by us specially for the use of coach and carriage painters. It is made of best drop black, and ground in drying oil and turpentine, and may be used for "flat" work, or gloss, by thinning with turpentine or oil as may be required. It will be noticed that all pure fine colors manufactured by us bear on the labels our full firm name and locality; and we would further state that all colors bearing our names on the labels are strictly pure.

N. B.—All our colors in small packages are put up in our patented thin-top cans. See page 9.

CHAPTER VIII.

GREEN PIGMENTS.

GREENS, so abundant in the vegetable kingdom, are rare in the mineral world, copper being the only metal which, in its combinations, affords the various shades of green in common use. All greens used in house painting are either copper greens or chrome greens.

Chrome green (when moderately pure) possesses a dense body, or covering property, and is classed among what are called body colors.

These greens are not permanent, being a combination of blue and yellow, which colors are not affected in like degree by the action of light. The copper greens are transparent, by far the most durable, and retain their brilliancy much longer when exposed to the action of the sun's rays.

Previous to the introduction of the chrome colors the only green pigment in common use was verdigris—French, *vert-de-gris.*

Verdigris—a union of oxide of copper and acetic acid—is produced by exposing small sheets of copper to the action of vinegar, in the following manner. The refuse of grapes, after the extraction of the juice, is placed in earthen vessels, which are covered with lids and surrounded with straw mats. The materials soon become heated, and fermentation, beginning at the bottom, rises till it permeates the whole mass. At the end of two or three days, the fermenting materials are removed to other vessels in order to check the process, lest putrefaction should ensue. The copper plates are prepared by rubbing them with cloth dipped in a solution of verdigris, and then set one side to dry. When the materials are all found to be in proper condition, the plates are laid on a horizontal wooden grating in the middle of a vat, on the floor of which is placed a pan of burning charcoal, which heats them to a certain degree. In this state they are put into earthen vessels, with alternate layers of the fermenting grape

lees, the vessels are covered with straw mats and left at rest. At the end of ten or fifteen days they are opened, to ascertain if the operation be completed. If detached glossy crystals be perceived on the surface, the grapes are thrown away and the plates are placed upright in a cellar, one against the other. At the end of two or three days they are moistened by being dipped in water, which is continued at intervals from time to time. This treatment causes the plates to swell, to become green, and be covered with a layer of verdigris. This is scraped off, pressed in paper sacks, dried by exposure to the sun and air, and becomes the verdigris of commerce.

Distilled Verdigris, erroneously so called, is made by dissolving one part of verdigris in two of distilled vinegar. The solution is then evaporated and crystalized. This article was formerly used in the paint-shop to some extent, but is hardly known now to the majority of painters.

Paris Green, or, more properly *Scheele's Green* (*arsenite of copper*), is a late discovery, and was first manufactured by the chemist whose name it bears. It is known in England as Emerald Green. It consists of about twenty-eight parts oxide of copper and seventy-two parts arsenic; is a highly poisonous substance, some persons being peculiarly obnoxious to its poisonous influence. Fatal accidents have resulted from its careless use. A few years since, the quantity of this pigment used in this country was enormous; but of late the chrome greens have taken its place. It is highly transparent, works badly under the brush, and, as painters express it, "covers badly;" consequently most of the trade prefer not to use it. In contrast with it, however—so brilliant is this color—all other greens become dingy browns, and the eye refuses to recognize any other pigment as green for some seconds after looking at this dazzling tint.

Its mode of production is as follows: First, an arsenite of soda is formed, by adding arsenic to carbonate of soda, dissolved in boiling water; next, sulphate of copper (blue vitriol) is dissolved in water; both solutions are filtered, and the first is poured progressively into the second, so long as it produces a rich grass green precipitate; this being thrown upon a filter cloth, and

cleansed by washing away all particles soluble in water, is dried and pulverized.

Chrome Green.—This well-known and serviceable pigment is another of the products of the metal chromium, in combination with prussiate of iron. Chrome ore is a union of the oxides of chromium and iron, and is of rare occurrence. It is found in considerable quantities in this country, in Maryland, near Baltimore. The chief application of this ore is in the production of chromic acid (bichromate of potash), which is extensively used in dyeing and calico-printing, and in the production of the paints known as chrome colors. Chromic acid—literally, color acid—derives its name (the Greek original signifies color, or to color) from the property it possesses of throwing down a colored precipitate when added to the saline solutions of certain metals.

The pigment known as Chrome Green is made by mixing together Chromate of Lead (Chrome Yellow) and Prussiate of Iron (Prussian Blue). This product is combined with an earthy base, either Sulphate of Baryta or Silica, in proportions to suit the market as to price. It is sold under various names, as Chrome Green, Brunswick Green, Imperial Green, Hampden Green, Mount Vernon Green, Persian Green, Magnesia Green, &c., &c.

These paints differ only in the quantities of coloring matter which they contain, and in the different tones of color. Under whatever name, they are simply earthy substances colored with a mixture of blue and yellow.

The tones and tints of greens are distinguished by the following names—that is, the names given are those by which the greater majority of people speaking the English tongue will best comprehend the idea intended to be conveyed: Grass Green, known among pigments as Emerald or Paris Green (this color best represents pure green; the others are mostly shades and tints, or broken colors, including a mixture of white, or black, or red, or, perhaps, of all these); Verditer, or Verdigris Green (a blue green, changing, when used in oil, to a bronze hue); Pea Green, Leek Green, Sea Green, Parrot Green, Apple Green, Tea Green, Olive Green, Blue Green, Yellow Green, Rifle Green, Bronze Green, Sage Green.

Masury & Whiton's Permanent Paris Green.

This style of green, though not at present in so great demand as in former years, is to a certain extent indispensable, there being no substitute for it where a green of pure color is required.

Masury & Whiton's Permanent Green,

for blind painting, &c. This paint is of a very bright, lively tone of color, of good body, working freely under the brush, and is durable.

Masury & Whiton's Pure Chrome Green.

This color is put up of both dark and light shades, and possesses dense body, or covering property.

CHAPTER IX.

BLUE PIGMENTS.

NATURE, so prodigal in the dispensation of green tints throughout the vegetable world, has been correspondingly chary in the diffusion of pure unmixed blues. Among the wild flowers of the woods and fields, and the thousands of cultivated exotics in gardens and green-houses, one may look *almost* in vain for a perfectly pure blue tint. The slightest admixture of yellow causes a green tinge, and a trace of red produces a purple or violet color.

The only blues used in house painting are Prussian Blue, Cobalt Blue, and imitation of Ultramarine.

True Ultramarine.—This beautiful blue (which formerly sold in London at twice its weight in gold) is of Nature's own production, and has never been equaled by chemical skill.

It is produced from *lapis lazuli*, a precious stone found principally in Persia and Silesia.

It is the purest in tint, and at the same time one of the most permanent pigments known, being nearly free from any tinge either of purple or green. It is of no importance to the house painter, except as a matter of curiosity.

Imitation Ultramarine is the product of chemical skill, and was discovered by a French chemist—Guimet. It is said to be manufactured from precisely the same materials as are found on analyzing the lapis lazuli, viz.: silex, soda, alumina, and sulphur; and so nearly does this artificial product resemble the genuine, that good judges of color have failed, at first sight, to distinguish the real from the factitious. Its manufacture is confined mostly to Germany. It is largely used in the coloring of paper hangings and on interior decorations.

Prussian Blue—Prussiate of Iron, or Ferrocyanodide of Iron

—is a deep-toned, brilliant, transparent color, bordering slightly on the green tinge. It possesses wonderful coloring property, and is used extensively by the artist on miniature draperies. It serves admirably to represent blue velvet, and mixed with carmine, all the varieties of purple, violet, maroon and cherry-colored velvets are obtained. It is little used by the house painter in its pure state, but for producing, with white, the different tints of lighter blues.

Prussian Blue is a chemical compound of iron and the gaseous substance known as *cyanogen*. It is produced by boiling together Prussiate of potash, green sulphate of iron (copperas), and nitric and sulphuric acids in certain proportions. The precipitate is washed, filtered, pressed and dried. This is known as *pure* blue, China or Chinese blue. The cheaper kinds are produced by adulteration with chalk or China clay; starch, also, is sometimes used. A good blue is known by the following tests: It feels light in the hand, adheres to the tongue, has a dark, lively blue color, and displays, when broken, a copper-red lustre. If adulterated with chalk or other carbonate of lime, it will effervesce when treated with acid; if with starch, it becomes pasty when mixed with boiling water

Antwerp Blue is a lighter colored and somewhat brighter blue than prussian blue, but possessing all the other qualities of that pigment, except its extreme depth. It has naturally a green tinge, rendering it well adapted for mixed greens.

Cobalt Blue is oxide of cobalt with alumina. It is used to some extent in house painting.

Blue Smalt is glass colored with oxide of cobalt.

Blue Verditer is a blue oxide of copper, or precipitate of nitrate of copper with lime. It is a pale, bright blue, deficient in color, and not much in request, though it was formerly extensively used in making washes for walls, when paper hangings were not as cheap and common as at the present day.

In color nomenclature, blues are distinguished by the following names: Indigo Blue, Sky Blue, Pale Blue, Smalt, Cobalt Blue, Ultramarine or Lapis Lazuli, Light Blue, China Blue, Prussian Blue, and Turquoise.

Masury & Whiton's Pure Prussian or China Blue.

This color is ground perfectly fine, possessing wonderful strength and depth of color. For mixing with white, to produce the lighter tones of blue, it will be found most economical.

Pure Ultramarine Blue, ground in oil, for ornamental and decorative painting. This article is sometimes demanded in oil; but as (like the true Vermilions) it requires no grinding, we would advise the keeping of it in stock as a dry color, mixing it only as it may be required for use.

CHAPTER X.

RED PIGMENTS.

Of the primary colors, red has the most extensive range of combination. In the list of colored pigments, reds are the most numerous, and, in producing the tints and broken colors, the most important.

Red (including crimson and scarlet and purple) is the most pleasing of all the colors, and exercises a wonderful fascination for all ages and conditions of mankind.

It is associated with our most pleasing recollections and all our ideas of youth and beauty. We speak of rosy health, and rosy life, and rosy hopes. It has been the favorite color of poets and painters in all ages. It is employed to depict health and loveliness in woman—as those "*vermeil*-tinctured lips;" and in the tomb scene in Romeo and Juliet, "for *beauty's ensign* yet"—"Is *crimson* in thy lips and in thy cheeks, and Death's *pale flag* is not advanced there;" and in Taming of the Shrew, we find, "Such war of white and red within her cheeks;" and again, in Romeo and Juliet, "Else would a maiden blush bepaint my cheek." It is also the favorite color in most national emblems, and in the ensigns of war, and ambition and victory. Shakespeare says, in King Henry II.: "He is come to open the *purple* testament of bleeding war;" and in the same: "Change the complexion of her maid, pale peace, to *scarlet* indignation." Crimson is suggestive of health and strength, of womanly beauty and manly vigor; and crimson sunsets give promise of bright days to come.

Nature has confined her use of reds mostly to the painting of the petals of flowers, and the tempting hues of luscious fruits, and the gorgeous plumage of tropical birds. Nowhere is it to be seen in the sky (except in occasional sunsets), in the water, or in

the earth; and in the general landscape, so small is its proportion, compared with the other colors, that it may almost be said to have no place there.

Among *pigments*, CARMINE is the purest type of red. This beautiful and familiar color is a product of the animal world, being the coloring matter extracted from the females of the insect known as cochineal. These insects abound in Mexico, and are fed on the leaves of a certain species of the cactus. There are plantations of this cactus, principally in the province of Oaxaca, where these insects are tended with as much care as is usually bestowed on silk-worms. At the proper season the insects are picked from the plant with a dull knife, and killed by being immersed in hot water, or by being placed in a hot oven. It is said that it takes seventy thousand of them to weigh a pound.

Carmine is prepared from the boiling solution of cochineal, by adding alum and carbonate of soda. It is said to have been discovered by a Franciscan monk, at Pisa, in the preparation of a medicine of cochineal and salt of tartar.

Carmine is much used in dyeing, and not a little of it is consumed in imparting to the cheeks of fair maidens that beautiful bloom which is so much admired.

The grades of carmine are distinguished by numbers; that known as No. 40 being the highest grade.

VERMILION is a compound of quicksilver and sulphur, in the proportion of about one hundred parts of the former to sixteen of the latter. It occurs in nature as a common ore of mercury, called cinnabar. It is known to the trade as Chinese, Trieste, English, and that manufactured in this country as California vermilion.

For many years the only vermilion used in this country was that imported from China, which comes wrapped in papers, containing about one ounce each.

It is now, however, used in comparatively enormous quantities, and the preference is given to the article of English make.

It is of different shades, and is distinguished as dark and light; the latter being the most expensive. Large quantities of Trieste vermilion, also, are consumed in this country, it being considerably cheaper than the English article.

Vermilion is a rich, bright color, of dense body, and permanent when exposed to the light. American vermilion, so called—a rather poor imitation of true vermilion—is made from white-lead and chromic acid (bichromate of potash). These are boiled together, washed, filtered, pressed, dried, and pulverized, either with rollers or with the hand. It must not be rubbed so hard as to break the crystals, or it loses its color and shows what it *really* is, an orange chrome. The manipulation is quite detrimental to the health of the workmen engaged in its manufacture.

Venetian Red.—This most serviceable and permanent color is an artificial ochre, prepared from sulphate of iron. It is made in England, mostly, in the vicinity of Newcastle-upon-Tyne. When used in its pure state, it is one of the most durable colors known. The bright red stain will remain on a building painted with it, long after the last vestige of the oil has disappeared—indeed, after the wood itself has become corroded by time and the elements.

It is but little used in house-painting, in its pure state, but is very serviceable in making grounds for black walnut, rosewood, mahogany, &c.; also for making durable gray tints, in connection with blue.

Indian Red is a deep, laky-red earth, chiefly a very rich iron ore, or peroxide of iron. It is permanent, of very dense body, and is used mostly for tinting. With white and ultramarine, or Prussian blue, it produces fine clear grays.

Red Lead is a pure oxide of lead, and is produced by exposing metallic lead to the action of heat, taking care not to fuse it.

It is mostly employed as a pigment in painting iron vessels and iron work generally. It has an affinity for the latter metal, and serves admirably in protecting it from corrosion.

Orange Mineral is another name for red lead, and is produced by the slow calcination of white-lead in iron trays.

This form of red lead is not used as a pigment.

Light Red is burnt ochre, not used in house-painting.

Rose Pink and the *Wood Lakes* are earthy substances, stained with the coloring matter extracted from tropical forest trees.

They are but little used in oil, but to some extent in decorative painting, in water colors, and in coarse scene-painting.

The different sensations produced by red and its combination, are distinguished as Red, Carnation, Blood Red, Crimson, Scarlet Purple, Vermilion, Fire Color, Madder Color, Alkanet Color, Pomegranate Color, Cherry Color, Pink, Peach Color, Damson Color, Claret, Brown Purple, Violet, Mulberry, Lilac, Apricot, and Orange.

Masury and Whiton's Pure Venetian Red.

This article is made from the most carefully selected Newcastle red, and is ground very fine in boiled oil, especially for house-painters' use. We desire to call the special attention of painters to the fact that our ground colors, owing to a peculiar method of preparing the oil in which they are mixed, do not become fatty and stringy from being kept long on hand, but retain their original freshness—and that plastic character so much desired by all good judges of colors in oil—for any length of time. The writer has learned from long experience that colored paints can not be properly ground, with reference to their original freshness, in common raw linseed oil.

CHAPTER XI.

YELLOW PIGMENTS.

In nature, pure, unmixed yellows are found mostly in the floral kingdom. This color is not specially a favorite, and must be sparingly used in internal decorations and furniture. Extreme fondness for vivid yellow is manifested mostly in uncultivated, undeveloped human intellects—as among barbarous negro tribes, and in young children. Generally, the hues of yellow are not associated with pleasant recollections, but with jaundice and yellow fever. An ill condition of health is indicated by a yellow complexion. The atmosphere assumes a yellow hue on the near approach of earthquakes and hurricanes. Undue secretions of the bilious fluid cause objects to assume a yellow tint. Blue discomforts seem temporary in their nature—fitful, soon to be succeeded by rosy hues; but yellow seems to be the tone of despair, of permanent melancholy. A yellow flag is hoisted on shipboard when an execution is about to take place, and yellow flags warn us of hospital fevers and the "pestilence that walketh at noonday."

A slight tinge of blue no doubt suggested the idea of "green and yellow melancholy." So prevalent an impression can hardly be the result of accident, but would seem to spring from natural causes.

Chrome Yellow (chromate of lead) is, strictly speaking, the only yellow pigment used in house-painting, the yellow ochres being yellow browns of various shades.

This brilliant yellow (chrome) is readily produced, and one so disposed, may become an amateur color-maker at a small outlay of time and money. Sugar of lead (*acetate of lead*), in solution, and chromic acid (*bichromate of potash*), in solution, when mixed together, instantly assume a bright yellow color, and precipitate, when left at rest, the pigment known as chrome yellow.

This is washed in cold water, treated with lime to produce the deeper or lighter tones, filtered, pressed, and dried. The result is pure chrome yellow, which is cheapened by admixture with carbonate of lead, barytes, carbonate of lime, and China clay.

When pure, it is a body color to the last degree, possessing a wonderful opacity and covering property, and also retains its color when exposed to the light, though it is peculiarly sensitive to the influence of gases.

Sulphureted hydrogen changes it in the same manner as this gas changes white-lead—that is, by uniting with the lead and forming a sulphuret of the latter metal.

Cadmium Yellow (sulphuret of cadmium) is one of the recently discovered pigments, being produced from the metal cadmium in combination with sulphur. It is used mostly by landscape painters—chiefly in representing gorgeous sunsets. It is the most intensely brilliant of any known yellow pigment.

Yellow Ochre.—This most useful and indispensable color, is a native pigment, and deposits of it, varying in shade and fineness, are found in various localities. (The word ochre, in its original sense, signifies *pale*, but is now applied indiscriminately to all colored earths, whether yellow, red, brown, or black.) The most important, are those known to the trade in this country as French ochres, and further distinguished as Rochelle ochre and Havre ochre. The former is the more highly esteemed, being finer, and working more smoothly and freely under the brush.

In house-painting, they are rarely used unmixed with white, as the pure color, when in oil, gives a rather deep yellow-brown; but mixed with white, in varying proportions, fine soft yellow drabs are produced, and pale delicate cream tints.

These ochres are inflexibly permanent in color, and are exceedingly durable when exposed to the action of the weather. The quantity annually imported into the United States is about three thousand casks, or a thousand tons.

Yellow colors are distinguished as chrome yellow, or lemon, brimstone, corn color, straw color, buff, saffron color, golden, canary, ochre, and orange.

Masury & Whiton's Pure Chrome Yellow.

This yellow is put up in one and two-pound patent thin top cans, of both lemon and orange shades.

Masury & Whiton's Washed Dutch Ochre.

This yellow is prepared only by us, and is specially intended for making grounds for oak, and for producing, with white, pale delicate straw tints. It is ground to the last degree of fineness, and works as smoothly under the brush as old English white-lead.

CHAPTER XII.

BROWN PIGMENTS.

As has been before remarked, the natural *brown* earth-paints are, to a certain extent, more brilliant in tint, and produce clearer, purer tones of color than do those paints which are the result of chemical operation. They are, too, as a rule, inflexibly permanent and highly transparent.

Terra de Sienna is a ferruginous native pigment, of a yellow-brown hue, producing, with white, bright sunny tints; and that known in commerce as Italian Sienna is the most esteemed, and is, in fact, the only article bearing the name of sienna which possesses any intrinsic value as a paint.

The so-called American sienna is vastly inferior both in color and transparency. Crude or raw sienna, when subject to a high degree of heat, loses its yellow complexion, and takes on a deep, clear, brown-red hue, retaining at the same time all the transparency of the unburnt material.

It is an invaluable pigment, and is extensively used in every department of painting. By admixture with Roman or yellow ochre, or raw sienna, or any other transparent yellow, and Antwerp blue, or indigo, it affords fine olive greens.

Burnt Sienna is a rich, transparent brown-orange. It has strong coloring properties, and is permanent to the last degree.

UMBER.

Raw Umber is a native ochre, and occurs in the island of Cyprus. It is known in the trade as Turkey umber, although a great portion of the umber sold in this market is obtained in the State of Virginia. Genuine Turkey umber is a soft brown pigment, transparent in oil, and abounding in manganese, from the

presence of which it derives its drying property. It is one of the most useful colors in the stock of the house-painter, and is much used in graining, and in producing, with white, pure Quaker-drabs and browns. With blue, it affords good neutral green. Very permanent.

The American substitute for this pigment seems to possess none of the properties of the genuine article, except its resemblance in color.

Burnt Umber is the natural umber calcined. It is much used both for graining and for making, with white, clear warm browns and stone colors. No pigment in the stock of the painter is better known and appreciated than this. It is transparent and permanent. These colors (siennas and umbers) require to be very carefully prepared and finely ground, as it is only by reducing them to the last degree of fineness that they show their true colors.

Van Dyke Brown.—This useful paint is a bituminous earth of vegetable origin. The most valuable kinds are found in Germany. The color is a very rich, deep, transparent brown. It is a favorite color with many artists, and is used by the house-painter mostly for graining. It is valueless unless very finely ground. Boiled oil should be used in grinding this pigment, as it is a non-dryer to the last degree. It is clear in its pale tints, and deep and glowing in shadows. Very permanent.

Spanish Brown—a coarse, native ochre, of dull brown color, of dense body, suitable for roof-painting when a dark color is required. There are other browns, as Sepia (the concrete gall of the cuttle-fish), Mars Brown (an artificial umber), Cassel Earth, (a native pigment), Madder Browns, &c. These are used principally by artists in landscape and figure painting, in oil and water, mostly however as water-colors.

The browns are called broken colors, and known as Brown Russet, Red Brown, or Horse-chestnut, Chestnut, Light Brown, Coffee Color, Tawny, Sorrel (horse), and Puce.

Masury & Whiton's Pure Raw and Burnt Turkey Umber.

This umber, prepared by ourselves, is selected for us at Cyprus, and imported directly, whereby we receive the very best quality

of Turkey umber which can be obtained, at the lowest possible price. That which we put up under our own names is ground with special reference to the wants of the painter and grainer, being perfectly fine and warranted strictly pure. It will be found, in actual use, by far the cheapest article in the market.

Masury & Whiton's Pure Burnt Italian Sienna.

Masury & Whiton's Pure Raw Italian Sienna.

These colors, like all our Grainers' Colors, are ground in prepared drying oil, and are selected with the greatest care as to color and quality. In transparency, fineness, and brilliancy of color, they will be found unequaled.

Masury & Whiton's Van Dyke Brown.

This valuable pigment is imported directly by us, and is the most esteemed of any yet discovered in Germany. In the whole catalogue of paints there is not one which requires more care in its manipulation and preparation than this.

Masury & Whiton's Brown Stone Color.

Special attention is called to this mixture, as tending to a great saving of time and trouble on the part of the painter in making brown stone color, any shade of which may be produced by simply adding white-lead with our prepared compound. This mixture contains no Venetian Red, and will prove less liable to fade than stone color produced in the ordinary way.

CHAPTER XIII.

OILS.

Oils are divided into two great classes: the fat, or fixed oils, and the volatile oils. Linseed-oil is a very good example of the former class, and oil of turpentine (spirits of turpentine, erroneously called) of the latter.

These two fulfill all the requirements of the house-painter, and are the only ones of any particular importance in the "trade."

All fixed oils and fatty substances, whatever their origin, possess the same ultimate constituents and mostly in like proportions, and differ but little in specific gravity—that is, the weight in proportion to the bulk is nearly the same in all—the extremes being 0.96 for castor-oil, and 0.89 for cocoa butter. The specific gravity of linseed-oil is 0.934. Supposing a cubic foot of water to weigh 1,000 ounces, the same bulk of linseed-oil will weigh 934 ounces.

Linseed-oil was formerly measured by the gauging rod, in this country, but now by weight, seven and a half pounds being the standard weight for the measure of a gallon.

Certain oils, in contact with the air, undergo progressive changes; they thicken, and eventually dry into a transparent, yellowish, elastic substance, which, after very long exposure, becomes hard and brittle. Linseed-oil seems to possess this quality in a greater degree than any other, and from this derives its value in the preparation of varnishes and painters' colors. Many of the fixed oils possess this siccative, or drying property, particularly those extracted from seeds and nuts. Some of the animal oils also possess it, in a greater or less degree; but linseed is the only article which gives oil possessing this property in sufficient quantities for general use.

The cause of this change from liquid to solid, is brought about by absorption of oxygen from the atmosphere—it being purely a

chemical process, and not the result simply of evaporation, as some suppose. This drying property in oil may be greatly increased by boiling the same, in connection with certain metallic oxides, such as red lead and litharge. These articles *only* were, in former times, used for this purpose; but of late, the black oxide of manganese is extensively used: Turkey umber, also, to a certain extent, by varnish-makers, for this purpose, but that article derives its drying property from the presence of the last-named oxide. A varnish, made by dissolving gum-shellac in linseed-oil and turpentine, was formerly used almost exclusively for facilitating the drying of paint, but has mainly given place to a combination of metallic oxides, known to the trade as "patent dryer," which seems to answer a better purpose than any thing yet discovered.

Linseed-oil is obtained from flax-seed, by grinding the same under heavy stones, set on edge, and made to revolve on a bed of stone. Attached to the are edge-stone scrapers, which throw the seed into the circular track of the roller. The meal is placed in strong woven woolen bags, which bags are covered with mats made of horse hair and sole-leather, of a proper and sufficient width to protect the bags in the operation of pressing. These mats, with their contents, are subjected to an immense hydraulic pressure, and the expressed oil flows off into large iron tanks, where it is allowed to settle. What remains in the bags after the pressure is known as oil-cake. The great bulk of this article is exported to England, where it is sold as food for cattle. The following figures will convey an idea of the enormous amount of linseed-oil used in the United States:—

There were imported into this country, in the year 1867, two millions of bushels of linseed—mostly from Calcutta—which would give four million gallons of oil. The home product of flax-seed (or linseed) for the year is estimated at from 1,750,000 to 2,000,000 bushels; affording, at the lowest estimate, 3,500,000 gallons of oil—making a total of 7,500,000 gallons, most of which is consumed at home. In addition to this, there were imported from England 250,000 gallons of linseed-oil; making a grand total of, say 8,000,000 gallons.

Admitting the theory advanced in the preceding pages of this book to be correct, viz., that paint affords the best measure of civilization, the natural inference from these figures seems to be that we are marching with rapid strides in that path.

ADULTERATION OF OIL.

The adulteration of linseed-oil is practiced to a very great extent in this country at the present day—probably more so than at any former period. The high price which this article has borne since the second year of the war, in comparison with some of the less useful oils, has stimulated the ingenuity of men of an inventive genius to mix the articles, and sell the mixture under the name of the most respectable of the two oily copartners. As before said, the comparative high price of linseed-oil has rendered the process of adulteration profitable, even where the proportion of the cheaper material amounts to but a small percentage of the mixture. For example, supposing the market price of linseed-oil to be one dollar and fifty cents per gallon—which would be a fair average of prices during the last three or four years, the substitution of only ten per cent., or four gallons to the barrel of forty gallons, of an oil the market value of which is only sixty cents per gallon, gives a profit of three dollars and sixty cents—an enormous profit on an article of such general and certain demand, and which is sold at wholesale ordinarily at a merely nominal profit.

The adulteration by mixing with inferior oils is carried to a greater extent in boiled than in crude oil, as the liability to detection is much less with the former.

There are various tests for determining the purity of oil; but, unfortunately, those which are the most reliable are of no practical value to the painter. The application of a few drops of sulphuric acid to a film of the oil to be tested, on a piece of glass, is a good method of ascertaining its purity; but this involves a knowledge of the peculiar effects of this acid upon the different oils. A simpler method, but less reliable, is to heat the oil, when the presence of another oil may be detected by the

odor which exhales. Specific gravity, also, is a good criterion. The instrument used for determining the gravity of oil is called an oleometer, which is graduated to sink to zero in a certain oil raised to the temperature of boiling water. Linseed-oil is the most dense of any of the fixed or fat oils, with the single exception of castor-oil; therefore, an oleometer graduated to sink to zero in *pure* linseed-oil, would, of course, sink lower in linseed-oil which contained fish-oil, or any of the oils of less specific gravity, and the measure of adulteration would be shown by the figures on the stem of the instrument.

The presence of fish-oil in linseed-oil may be detected by agitation with a little chlorine gas, which blackens the animal oil, but has little or no effect on the vegetable oil. Unfortunately, these modes of testing are troublesome, and involve a certain outlay of time and money. The best inexpensive and ready test which the writer can suggest is, to put a few drops of the suspected oil in the palm of the hand, and then rub the palms of the two hands briskly together; after this has continued a minute, by applying the hand to the nose, the presence of fish-oil will reveal itself by its peculiar odor. These directions are of little value to those who conduct business in the large cities, and who can purchase their stock of oil directly from the crushers of seed; but it is hoped they may be useful to those who are remote from the place of manufacture, and who must ordinarily purchase from second or third hands.

OIL OF TURPENTINE.

This indispensable article, known to the trade as spirits of turpentine, is obtained by distilling the sap which flows from that species of the pine known as *pinus australis*, or long-leaved pine, which grows in great abundance on the coasts of North Carolina and Georgia. The turpentine is procured by tapping the tree, at first near the ground, with an ax made for the purpose. From one to three box-like cuttings are made in a tree, having capacity each of two or three pints. The sap, which runs from the tree only in warm weather, begins to flow freely in March, and is dipped out from the boxes with a peculiar-shaped ladle, and

deposited in barrels. The sap hardens on exposure, and soon forms a coating on the surface of the wood, which stops the flow. This surface must be removed occasionally, to renew the flow of the sap. Formerly, the bulk of the turpentine produced in North Carolina was exported in a crude state for distillation in the North; but now the principal portion is distilled in the State—the larger proprietors having stills of their own. These are not unlike the stills used for the distillation of spirits from grain and other substances, and have a capacity of from five to twenty barrels each. After the turpentine is drawn off, the residuum forms the common rosin of commerce.

When the trees are no longer profitable for their yield of turpentine, they are felled, cut up, and charred in kilns, producing tar, which, by boiling, is concentrated into pitch. The yearly average product of one acre of turpentine forest is about from twelve to fifteen barrels of crude turpentine, which yields about two barrels of spirits of turpentine and eight of rosin.

The statistics of the turpentine product, always difficult to obtain, are more so now than formerly. Before the war the estimated annual product of North Carolina was 800,000 barrels of crude turpentine, equal to about 115,000 barrels of spirits of turpentine, and 45,000 barrels of rosin.

Oil of turpentine is a most important, indeed, indispensable, article in house and other kinds of painting but it requires to be handled with skill and judgment. As a rule, too much of it is used in exterior work, and not enough in interior work. When used to very considerable extent for exposed situations, it impairs the water-proof property of the paint, and consequently its durability. Colors mixed entirely with turpentine are but little more durable than water colors.

In the preparatory coats for dark-grained work, such as outer doors and vestibules, when a finishing coat of varnish is applied, the proportion of turpentine should be as great as possible—such work being exposed to the direct rays of the sun, becomes so heated that it is very apt to blister, whereby the best job will be completely spoiled.

The remedy for this state of things is expensive and troublesome;

it being no less than the entire removal of all the paint, either by washing with powerful alkalies, or by the application of a high degree of heat and scraping. Such a result can be prevented only by using as little oil as may be, to spread the paint evenly, and finishing with the best attainable coach-body varnish.

For interiors, turpentine is used in the finishing coat almost entirely, for the reason that clearer, purer tints are attainable than with linseed-oil—that the paint does not discolor so quickly, and the flat dead finish which it produces, conceals by its lesser reflective power, the irregularities and imperfections of the surface.

Spirits of turpentine dissolves all resinous substances, and is a very good solvent for india rubber.

CHAPTER XIV.

THE ACTION OF LINSEED-OIL UPON PAINTS.

Of all the fixed and fatty oils, linseed-oil, when not exposed to the atmosphere, undergoes the least change of condition. It does not become rancid and emit an unpleasant odor, as do the animal oils; nor does it thicken and become viscid, as do some of the vegetable oils. It remains limpid under all ordinary temperatures, and does not congeal till cooled from 4° to 18° below Fahrenheit.

All these qualities fit it admirably to serve as a vehicle for mixing and spreading paints. It has no effect on paints, except simply to darken the shade or tint, and render them less opaque.

This is shown by mixing whiting, or Paris white, with oil. These substances are, when dry, to all appearances, as opaque as white-lead; but when wet with oil, they become semi-transparent, and assume a yellowish tint. The effect is the same precisely as to saturate white writing-paper with oil. It loses its opacity, and becomes transparent. [This word is used in its common, and not in its technical sense.]

White-lead, from its wonderful opacity or body, is not thus affected, and from this property it derives its chief value as a pigment. In no other respect does linseed-oil have the slightest effect on the paint when mixed with it.

No possible preparation of the oil can change the nature of the pigments which are put into it. Within the last ten years, it has become the custom of the trade to mix white paint, for grinding, in oil that has undergone the bleaching process.

This operation of bleaching is performed, either by subjecting the oil to a certain degree of heat, or by treating it with acid, and afterward washing with steam.

In either of these processes, the oil precipitates a portion of its

coloring matter, and assumes a paler tint; otherwise it undergoes no change; and economically considered, the operation is a losing one, there being a decrease of bulk, with no corresponding gain in quality—added cost, with no improvement in either the waterproof or siccative property of the oil. No pigment is improved, either in density, covering property, or tint, by being mixed in linseed or other oil.

Some of the greens and blues, it is true, assume a darker hue on being mixed; but this is equivalent to varnishing. A better result still, is produced by mixing them in water or turpentine, and afterward applying a coat of varnish. What the writer wishes to enforce, is the fact, that no possible preparation of oil can impart a value to materials which of themselves are valueless.

The material used for adulterating paints is of itself utterly and totally valueless as a pigment, and it only becomes in a degree respectable from its association with materials which *are* intrinsically valuable. The oil which is used to spread it, can not improve it or change its nature.

To speak of oil as the base of paint, is the veriest nonsense—with as much propriety may it be said that water is the base of pigments which are used as water colors, as that oil is the base of oil paints. Water would be the better menstruum for paints, if some process could be discovered of rendering water color painting *water proof*.

Varnish certainly does this, but varnished work is not suitable for interiors. It produces a shiny, cheap, tawdry appearance, and reveals all the irregularities on the surface of walls and woodwork, which it is most desirable to conceal. For outside work, varnish is unsuited, because it will not resist the action of atmospheric influences. It cracks, grows rusty, and requires frequent renewal.

An oil to be perfectly adapted to the requirements of the painter, must possess the property of drying quickly without stickiness, must be inodorous (or at least free from any *unpleasant* odor), colorless, limpid, must not congeal, except at very low temperatures, must not discolor or turn yellow when not exposed to the light, and must be entirely water proof. When an oil, either

vegetable or animal, fulfilling all these conditions better than linseed-oil, shall be found, and can be furnished in sufficient quantity, at a price no greater than the average price of the oil produced from the seed of the flax plant, the finder may cry "Eureka." So far, no unctuous oil, except the oil of linseed, has been discovered, which possesses any *two* of the above named necessary properties combined with the first, which does not exceed the latter so far in cost of production as to render its common use altogether impracticable.

The flax plant should have a prominent place in the coat of arms of the guild of the house-painters, for without it the trade would hardly have had an existence.

CHAPTER XV.

HOUSE-PAINTING.

The object of painting the interiors and exteriors of houses and other buildings is mainly twofold. It is done with a view to preserve and beautify, the latter being predominantly the moving idea.

The *interior* of every man's house may, in a broad sense, be said to be his own, and the fitting and decoration of the same are matters which concern only himself and his friends; but the same can not be said of the *exterior*. *That*, to a certain extent, is a matter of public interest, and the owner is bound, by the unwritten laws of common weal and good fellowship—that is, morally bound—to paint and decorate the same with some deference to good taste and the rules of harmony, in the arrangement of colors and tints.

The writer contends that no owner or occupant has the moral right to put bright green outside blinds on a red-brown-stone or red brick front, or to place these colors in juxtaposition, in any public place; to thrust this horrible discord of colors in the face and eye of every passer-by, is not having due regard to the rights of others.

If outside blinds must be placed on the windows of brown stone and brick fronts, let them be painted in imitation of black walnut, or a dark brown, or a blue even, or orange; thereby exhibiting some regard for harmony, either by analogy or contrast. Any thing but green.

Happily, the mania for white houses with green blinds has subsided, and the public is, in a measure, relieved from those staring, glaring, dazzling, and discordant abominations.

The strong reflective power of white makes it unsuitable for exterior painting. It is painful to the sight, not in harmony with

the general landscape, and is suitable only for beacons and light-houses. It is the least durable of all pigments, and so, to be avoided on the score of economy.

The painting of the exterior of our houses, particularly of country houses which are isolated and conspicuous, affords a fine opportunity for a display of taste; yet in such matters we are, as a people, deficient in knowledge, and sadly indifferent as to effects, which is worse; for the former lack may be supplied by education; the latter defect is radical, and can hardly be cured in this generation.

As a rule, warm tints are preferable to cold, for exteriors of detached, or country houses; although grays, which are cool colors, may be exhibited with good effect, if harmony be attempted, by analogy rather than by contrast; as also drabs, either warm or cold. A very good effect will result from the use of a drab, made by tinting raw Turkey umber with white for the body of the house, and a much darker tone of the same color for the trimmings, which should be enough darker in shade to produce a decided contrast, whereby each color will be made to appear darker and lighter, respectively, than it really is when seen by itself. The lighter color will, in contrast, lose a portion of its warmth, and partake of the nature of gray. If a warmer tone is required, it can be produced by the addition of a small quantity of Dutch washed ochre. The darker tone of the color, produced by mixing white with umber, as before mentioned, will be warm enough. It is the larger proportion of white which gives the gray tone to the lighter color. Every color partaking of the nature of pink or lilac, must be avoided in exterior painting, as these are intractable colors, particularly the former, and can not be made to harmonize with other colors, either by analogy or contrast. Few people, not color blind, are insensible to the discordant effect produced by intermixing the green leaves of the lilac tree with a bunch of the flowers.

Pure gray—that is, black and white—is cold; and if dark in the shade, is gloomy. If gray be used for exterior painting, it should be a neutral gray, compounded of white and blue and red. Red, however, is a fugitive color, when mixed with white.

The trimmings should be of a much darker shade, to produce a contrast. It must be remembered that green blinds, with any tone of gray, is disagreeable. There seems to be a generally prevailing impression that *outside* blinds must, of necessity, be painted green, regardless of the color with which the same is placed in juxtaposition. This is unfortunate, as, with the single exception of some tone of orange, green discords with every and any color which would be suitable for exterior house-painting. Green discords with pink, slate color, brown, chocolate, russet, lilac (particularly a blue-green), scarlet, crimson, mulberry, claret, and with purple is the worst kind of discord. It is disagreeable with blue, gray, drab, and red.

Yellow is disagreeable with red, purple, scarlet, gray, lilac, and drab. Blue is disagreeable with pink, peach, gray, green, and blue-purple. Orange is disagreeable with lilac, and drab, and gray, but harmonizes with chestnut, and green, and gold, and blue, and brown. For a full account of the discords and harmonious combination of colors, the reader is referred to the work lately published by Messrs. D. Appleton & Co., of New York, entitled, "How shall we Paint our Houses?"

CHAPTER XVI.

PREPARATION OF WORK FOR PAINTING.

In preparing work for painting, too much care can not be exercised, as succeeding coats, and the final result depend very much on the proper condition of the work when the priming coat is applied. First, all the rough places in the wood should be rubbed down with a block covered with sandpaper; and the moldings and beads should be well cleaned out with sandpaper. Then (and this is a matter of prime importance), *every knot*, however small, every indication of sap on the wood, or discoloration of any kind, and every appearance of pitch or gum, should be carefully varnished over with *white shellac varnish*, if the work is to be finished in white or light tints; or, with varnish made from unbleached or common shellac, if the work is to be finished in dark shades. The common shellac, in the latter case answers equally well with the bleached article, and at less cost. This should not, under any circumstances be neglected, as it is impossible, in the nature of things, otherwise to make good work. Shellac varnish is made simply by dissolving bleached shellac in alcohol, in the proportion of two pounds of the former to one gallon of the latter. More or less of the gum may be used to give the required strength.

The varnish is easily diluted by the addition of alcohol, or made stronger by the addition of more shellac. [In cases where color is not important, the ordinary unbleached shellac will answer, and the cost is much less.] It is most readily prepared in a tin can or bottle, which requires occasional shaking during the process. A gentle heat facilitates the operation. It may be prepared in greater or less quantity, and rendered perfectly transparent by passing it through a filter paper. It then becomes the best possible varnish for pictures. The alcohol must be of a strength of ninety-five per cent.

When work is to be finished with two coats, the putty used for stopping the nail-heads, and other indentations, should be made of white-lead, worked up with common whiting to the proper consistency, and the filling should be done after the first coat shall have become well dried. When more than two coats are to be applied, the filling should be done between the first and second coats, with ordinary pure linseed-oil putty.

It should be adopted as a rule, never to apply *pure white* as a priming coat, no matter whether the work is to be finished with *one* or *four* coats.

The result will always be more satisfactory, if the first coat be stained. A little finely ground lamp-black answers as well for this as any thing.

The only way to produce solid uniform work is by making every succeeding coat *lighter* in tint than the one which preceded it. This is specially the case with walls and other extended flat surfaces. *No matter what the finish is to be, the first coat should always be darker than the one which succeeds it;* and the darker the shade of the finishing coat the more important it is that this rule should be observed. If the work is to be finished with black, prime with black; if with green, let that be the color of all the preceding coats. If with blue, let that color be the ground work. What can be more stupid than applying to work which is to be finished in imitation of black walnut, a priming coat of white? *All work should be primed especially with regard to the finishing color.*

There is not used half enough of dark colors in priming applications.

Venetian red, finely ground in boiled oil, deeply stained with black, and used very thin, in order to stain the wood as much as possible—is the best first coat for work which is to be finished in imitation of black walnut or other dark wood. The succeeding coats should be as dark as may be, with a view to the proper shade of ground work for the graining. In such case, if (as must happen in the ordinary course of events) the work becomes bruised or "chipped" by an accidental knock from a chair leg or other article of house furniture—the general appearance of it is little impaired

thereby. Quite the contrary, however, is the case if the underneath coats are white. There, an accident of the kind before mentioned, shows a white spot, which strangely proclaims the work to be a delusion and a sham. Dark colors, too, as the Venetian red before mentioned, make better foundations than white-lead or zinc; they dry harder and "rub" better, and, what is most important, cost less.

This matter having been duly considered, let us now proceed to the coats succeeding the first. Before applying a second coat, the first should be carefully rubbed, and all the nail-heads and other indentations carefully stopped with pure linseed-oil putty, using for flat surfaces a square-bladed putty-knife.

Puttying with the fingers should never be tolerated (good work is now the subject under consideration). This done, the whole should be carefully examined to ascertain if the oil in the former coat shall have revealed any resinous or pitchy spots not previously covered with the shellac. [But for the present high price of alcohol, the writer would recommend the application of thin shellac varnish to the whole surface between the first and second coatings.] These preliminaries being attended to, the work may be considered ready for a second coat. The directions as to rubbing with sandpaper are to be observed in all succeeding coats. As a rule, on *interior* work, paint should never be applied to a surface which has not been previously rubbed.

Sandpaper for fresh work, and pumice-stone for old work. Always distrust the education of a painter, in his trade, who goes to work without a lump of pumice-stone, a sheet of sandpaper, a putty-knife, and a rag to wipe off the spatters—sparks, as the Irish not inaptly call them.

Apropos of spatters! Every painter has seen (the result, too, of unpardonable negligence) plates of glass so covered with spatters, that, to remove them, would require more time than would serve to paint the wood-work of a "full-trimmed" window.

In priming work which is to be finished in oak, finely-ground French ochre is recommended. The objection to this pigment, that it does not work smoothly and easily under the brush, has arisen from its coarseness. Finely ground in boiled oil, it works

as smoothly as white-lead, and makes an excellent foundation for the succeeding coats.

For walls, the first coat should be as dark in shade, and as thin as practicable—the object being to stain the plaster as much as possible. Indeed, if the whole mass of plaster could be stained through and through, it would be desirable to so stain it.

The use of glue in wall-painting is of doubtful propriety. It should never, under any circumstances, be put on until after the second coat, and then rubbed on with a rag very lightly. In first-class work, however, its use is not recommended.

Plaster, mixed with weak glue size, which prevents its setting too rapidly, is the best material for stopping walls preparatory to painting, and each coat of paint should be carefully rubbed with worn sandpaper before the succeeding coat is put on.

For preparing walls, a small pocket-trowel will be found a most serviceable tool; or a trowel-shaped putty-knife, which is now coming into general use.

The preparation of ceilings for white-washing (or kalsomining as this operation is sometimes pretentiously called), is an operation requiring some skill and knowledge of "how to do it." A dirty ceiling which has been subjected to successive coats of white-wash, whether of lime, or whiting and glue size, can not be made solidly and smoothly white by additional white-washing. The mass has become spongy, and sucks up the water so quickly that the material can not be evenly distributed. In such case, the only way is to begin anew—to go at once "down to hard pan," removing all the previous applications, by washing and scraping. This is best effected with a broad-bladed, square-pointed putty-knife, keeping the ceiling wet meanwhile. Plaster (hard finish) is not of uniform density, and some spots are much more absorbent than others. To remedy this, a mixture of soft soap and alum, dissolved in water, should be applied with a broad kalsomine brush.

It is not assumed that mere verbal instruction can teach the art of whitening or tinting walls and ceilings in water colors.

To produce good results, great skill in preparing the materials, and dexterity in manipulation are required; and such work should

be intrusted only to competent hands. A mass of unsuitable material may be cheaply put upon a ceiling; but when the same shall require repainting, the cost of labor will be greater in removing the previous coating, than will be the whole cost of repainting. These remarks, too, apply equally to all kinds of painting; and reference is made to the whitening and tinting of ceilings, only because of the general impression that this kind of work may be performed by *anybody*.

The materials and tools used in painting are too costly to be wasted and worn by incompetent handling. "*Painting up*," "just to keep the *gardener* or *hostler* out of idleness," will prove, in most cases, a left-handed economy. Such experiments are prudent only where the services of skilled workmen can not be obtained.

CHAPTER XVII.

COMBINATION OF COLORS.

In mixing colors with each other, or with black and white, to produce the hues, tones, shades, and broken colors, it must be remembered that although the eye is the proper judge of what it sees, its judgment is not by any means infallible in such matters. The delicate organism of the eye soon becomes tired when exercised by certain color impressions. The fact is well known that the eye may rest without fatigue, for hours together, either by daylight or by artificial light, on the contrasted black and white of a printed page, but can not rest on a surface of brilliant red for a few successive minutes, without fatigue and consequent dullness to the color impression. It needs rest and recreation, and will naturally seek them by fixing itself on a surface of green, which color will appear unnaturally bright by contrast. Therefore, the eye is not in condition to estimate correctly the comparative brilliancy of reds, after looking at green, or of greens after looking at red. Green being the accidental color of red, the eye, when fatigued by looking too long at the latter color, rests naturally on its "complementary." Green, in simultaneous contrast with red, reduces it; but, in successive contrast, these colors mutually improve each other. The only way to judge correctly of the vividness of colors, is to compare them among themselves; that is, a green with a green, a red with a red, &c. For such comparison, a standard, of course, is necessary, and among greens the standard would be what is known among pigments as Paris Green.

A dull green, when viewed by the eye in its natural condition, may inspire the beholder as presenting a moderately good tone of that color. Place in contrast with this a green of brighter tone, and the first becomes dull and dingy, presenting the appearance

of a broken color. Now, introduce a still brighter green, and the second follows the first as the first moves farther away, becoming more broken. A still brighter color sends the first down among the browns, the second and third following. Now, present the pure green, and the eye, after being fixed an instant on that, refuses to see the preceding colors as other than greenish browns. So, a bright red becomes a dull brown in contrast with the pure red of carmine, and orange color becomes red by contrast with pure yellow. Almost any blue, when compared with pure blue of lapis lazuli, presents to the eye a purple or greenish tinge; and most of the hues of yellow, when compared with the pure yellow of chrome, partake of a tinge of red or brown.

To a better understanding of the question of color combination, it becomes important that the terms used in distinguishing colors shall be properly defined. In common use, red is supposed to signify some color wherein the red ray predominates; and so of the other primitives, blue and yellow.

Blue-purples are commonly called blue, and yellow-orange, yellow; but in treating the question of the combination of colors, the names must be subjected to a stricter definition.

The first (*simple or true cólors*) are blue, red and yellow. Second to these are the *compounds:* purple (made up of blue and red); orange (made up of red and yellow); and green (composed of blue and yellow). Thirdly (*mixed colors*): russet (purple and orange); citrine (orange and green); and olive (green and purple). Next come the (irregular colors) browns (or broken colors), grays, neutral tints, drabs, stone colors, &c. Lastly (extreme colors), black and white.

The first division is the most intelligible; but still, it becomes important to understand exactly what is meant by blue, red and yellow, as each color is composed of different hues and tones, and the mere name is otherwise insignificant.

By blue should be understood (as by the other two) that color which appears in the solar spectrum when light is decomposed by the prism; but as the names are mostly conventional, it is necessary to describe them more particularly.

Blue may be considered equivalent to the deepest blue of the

sky—not sky-blue, but that tone of color which the sky presents in those climates where the atmosphere is clear, and where it appears to the eye an intensely bright blue. Among paints, true ultramarine best represents pure blue.

Red is not so easily defined. The word is used almost indiscriminately to describe crimson, and often scarlet and purple. The color of the blood is generally supposed to represent pure red; but this is as often called crimson or purple, particularly in the language of poetry. The ruby and carbuncle among gems, and the red currant among fruits, present good examples of red. Without pretending to decide which of these has the best claim to be considered a true red, it is suggested that the original *Verbena Melindris* is one of the purest types.

Yellow has been represented as gamboge moistened with water. Yellow is a strong and glowing color, and is, of all the colors, the least diminished by distance, having great reflective power. For this reason it must be displayed judiciously in colored ornamentation, otherwise it will occupy too great a place there. Among colored pigments, that color known as lemon chrome best represents pure yellow.

The compound colors, in distinction from the mixed colors, are compounds of any two of the three simple colors, as blue and red, yellow and red, or yellow and blue, making respectively, purple, orange, and green; but it would be a hopeless task to attempt to define the exact hues that are meant by the use of these terms. What, for instance, can be more indefinite than the name of purple, the tones of which are almost innumerable? So also of orange and of green, though of the latter in a less degree.

It would be a great gain if we could fix upon some well known and familiar flowers, and by prefixing the names of the same to the compound colors, so define the exact meaning of the words we use in distinguishing them; but as the tones of color in the same flowers vary so much in different climates and different localities, this method is impracticable, and we must continue to wander hopelessly in the maze, guessing, as best we can, at the idea intended to be conveyed by the use of the names of the compound colors.

There is also another class of colors distinct from the primaries, secondaries, and tertiaries, as browns, grays, and various neutral tints (into which black enters as a principal element), together with clay and stone colors, drab and others.

These, by way of distinction are sometimes called irregular or broken colors, or semi-neutrals. Many of them are very varied in their hues. *Browns*, for instance, have sometimes a deep somber character; others are brighter, as they have more red or yellow in their composition, as chestnut, &c.; yellow-browns, red-browns, and purple-browns, designate certain varieties, all of which hold a place among warm colors. Whenever such a quantity of blue is added to brown as to deprive it of its warmth, it passes into another grade of hues, and approaches the grays.

Of browns, the chief constituent is said to be yellow; and they are said to be compounded of yellow and black; of black, red, and yellow; of black and orange; of blue, red, and orange; of the three primaries, red, blue, and yellow; of the three secondaries; or of the three tertiaries; the richer brown having more red and yellow, the lighter brown being sometimes diluted with white. Brown also is compounded of red and black, and these form a better brown than most of those above enumerated; black and yellow give a very imperfect brown, and partake rather of an olive hue, and a similar objection may be made to blue and yellow.

Grays are composed of black and white; other combinations also form them, as blue, red, and yellow, in various quantities according to the character of the required hue, either with or without the addition of white.

The character of a gray will depend on the excess of one of its component colors; and a black-gray, a blue-gray, a green, an olive, or a violet gray, will take its tone from the greater quantity of the black, or blue, or of the blue and yellow (i. e. green), or of the blue and red (i. e. purple), &c., which may characterize it.

Another kind of gray or neutral tint is composed of purple and black; and other hues may be used with black so as to form various dark grays. As gray is a cold color, the addition of too large a quantity of warm red has an undue effect upon it, by altering its character from a cold to a warm hue, as the addition of an undue

quantity of cold blue to a warm brown changes the nature of the latter, and brings it into another class of colors. The addition of white has a modifying effect; and while red and yellow, varied in quantity, produce the different tones of scarlet and orange, when diluted with white they give straw, lemon, and clay colors; and drabs, as well as the lighter browns, are produced by the addition of white to their original bases. Any one of the primaries mixed with white forms a distinct hue, as does a union of any two of them with white; thus, red and blue and white, in different proportions, form varieties of purple, violet, and other mixed colors, varying according to the greater or less quantity of blue and red.

It would seem an easy task to lay down rules which might serve to guide those who are ignorant in the art of compounding colors; but it must be borne in mind always that the art of mixing colors to produce certain required tints, hues, or tones, can not be taught when the perceptive faculty necessary to distinguish colors is wanting.

It is easy to say that blue and yellow, compounded, produce green; but this rule is of little use to one who can not distinguish orange from yellow, or blue-purple from blue.

Where the faculty of distinguishing colors exists, in imperfect development, it may, doubtless, be improved; but this improvement must come from observation, not from rules.

Black, white, red, and yellow, or blue in place of black, will produce any shade of drab, or any shade of brown, or green, either warm or cold.

Blue and yellow, with white, will produce any shade or tone of green, excepting Paris green.

Blue and red will give, in combination, any tone of crimson or purple; and with white—pink, peach, carnation, &c. Red and yellow produce any tone of scarlet and orange, and with white, lemon, buff, straw, canary, &c.

Beyond this simple statement there can be no rules given which are of any practical value in the compounding of colors.

CHAPTER XVIII.

WEIGHT OF PAINT AND MEASURE OF OIL REQUIRED TO COVER A GIVEN NUMBER OF SUPERFICIAL FEET OF WOOD OR BRICK.

THE figures given below are the result of careful and repeated experiments, made under the direct supervision of the writer. The wood used was ordinary machine-planed pine ceiling board, of an average width of nine inches. Each succeeding coat was applied without rubbing the previous coat with sandpaper.

The paints were, in all cases, free from any admixture of adulterating materials, and were of the best quality. No rule can be given as to the exact quantity of oil required to reduce white-lead, or other paints, to the proper consistency, under all circumstances and for all kinds of work. A rough surface requires not only an increased quantity of paint, but an increased quantity of oil, in proportion to the paint. The temperature of the atmosphere, too, affects the result; for, although linseed-oil does not congeal, except at very low temperatures, it becomes less fluid as it loses heat, and, consequently, a greater proportion of oil is required in cold than in warm weather. Allowance must be made, also, for *waste* of material. A wooden package, supposed to contain one hundred pounds of white-lead, will not afford a hundred pounds of mixed, or thinned paint, minus the oil, for the reason that a portion of the oil in which the lead was ground will have been absorbed by the surrounding wood, and a portion of the lead will, in consequence, have become hard and unfit for use.

The amount of material thus wasted, will depend almost wholly on the lapse of time ere the material shall reach the hand of the consumer. The smaller the package, the greater will be the proportionate loss; in kegs containing one hundred pounds it will be from three to four per cent.

To paint one square yard of the surface of wood, as before de-

scribed, required, for first coat, four ounces of pure white-lead, mixed with oil, in the proportion of seven ounces of oil to one pound of lead; accordingly, to cover a surface comprising one hundred square yards, would consume twenty-five pounds of mixed (white-lead) paint, which mixture would consist of about 17½ pounds of ground white-lead and 7½ pounds of oil, which is the exact weight of a gallon. Thus, 100 pounds of ground white-lead, with 43 pounds of oil, will give a single coating to 572 square yards of surface of moderately seasoned pine wood. When the unpainted surface has become very dry and absorbent, from long exposure to the weather, allowance must be made therefor. For a second coating—which should not, as a rule, be applied until after a lapse of six or eight days—the proportion of oil to the lead should be considerably less than for the priming coat, say, at least, ten per cent., or in the proportion of 5 gallons of oil to 100 pounds of ground white-lead. This mixture would give a coating to about 625 yards of surface which had been once painted. Great care must be observed in applying the second and succeeding coats, that the paint be not too thin; particularly when the temperature is liable to become materially lower during the night. Otherwise the surface is liable to wrinkle, crawl, creep, as painters variously express it.

The foregoing observations as to quantity, &c., will apply to any number of succeeding coatings.

The sum of the foregoing is, that 100 pounds of pure ground white-lead, with the oil required to thin it, will give three coatings to 200 square yards of ordinary pine wood surface.

When white zinc is used in place of lead, the proportions and quantities materially differ.

To make a paint of dry white-lead, of the proper consistency to spread with a paint brush, requires about one-half its weight of linseed-oil; while zinc, under the same conditions, requires nearly its weight in oil; hence, it follows that a very much smaller quantity of the latter oxide will be consumed in coating a given surface than of the former.

As has been stated before, 100 pounds of lead, with the requisite proportion of oil, will cover a surface of about 572 square yards

of new wood. The same quantity of white zinc—that is to say, 150 pounds of zinc paint of the proper consistency for first coating new wood, will cover about 800 square yards. The lead coating, however, owing to its greater opacity, will better conceal the wood, and give a more uniform surface than will the zinc paint. The cost of labor in applying the zinc, too, will be greater than the cost of applying the lead; so that, economically considered, there is not so great a difference in favor of the zinc as would at first sight appear.

(For the writer's views as to the comparative merits of these two most important pigments, the reader is referred to Chapter VI, under heading of White Pigments.)

Finely-ground French yellow ochre, dry, requires oil to make it of proper consistency for priming new wood, in the proportion of about five ounces to two; that is, the proportion of oil by weight will be about five-sevenths of the mixed paint. One pound of this mixture will cover a surface of eight yards of new pine wood; and the cost, in comparison with white-lead, taking into account the greater surface which a given number of pounds will cover, is about as 5 to 10, while in point of durability, the difference in favor of the ochrey substance will be much greater. On tin roofs, for instance, or other exposed situations, the ochre paint would remain intact when the white-lead would have almost entirely disappeared.

Lamp-black requires more oil in proportion than any substance used in painting, one pound of pure black requiring about two (2) gallons of oil to make it of proper consistency for the painting of new wood. One pound of this mixture will cover about nine (9) square yards of new wood surface, and for second coating, about sixteen square yards—a single ounce, only, being required to cover one square yard of surface.

The following summary will show, in a condensed form, the quantities and proportions required for the various kinds of work.

When spirits of turpentine is used instead of linseed-oil, for thinning lead or zinc, as is the case in most interior work, the proportions differ very materially. As has been shown before.

Ground white-lead requires, to thin to proper consistency for painting surfaces which have been already painted, oil in proportion of about forty pounds of the latter to one hundred pounds of the former. When turpentine is used, the proportions are about as one of the fluid to eight of the lead ground in linseed-oil. The quantity by weight of the latter mixture required to cover a given surface, is about the same as the oil paint; but the quantity of lead expended is much greater, of course, in proportion to the fluid.

SUMMARY.

One hundred pounds of pure white-lead, ground in oil, requires, to thin it to a proper consistency for painting first coat on new or unpainted pine wood, about—

Six gallons of linseed-oil, at ordinary temperature.

One hundred pounds of pure white-lead requires, to thin to proper consistency for painting a second and succeeding coats, about—

Five gallons of linseed-oil.

One hundred pounds of pure American white zinc, ground in oil, requires, to thin to proper consistency for first coating or priming new pine wood, about—

Ten gallons of linseed-oil.

One hundred pounds of zinc, as above, ground in oil, requires to thin for second coating, about—

Seven gallons of linseed oil.

One hundred pounds of *dry* finest French yellow ochre requires, to thin to proper first-coat consistency, about twice its weight in oil (rather more than less), or about—

Twenty-seven gallons of linseed-oil to one hundred pounds of the dry material.

No reliable figures can be given for the thinning of yellow ochres and other earth-paints ground in oil, for the reason that 90 per cent. of such paints, when put on the market as "*ground colors*," are very much adulterated with sulphate of baryta, which substance requires only one gallon of oil to wet one hundred pounds of it.

PURE WHITE-LEAD.

One pound of pure white-lead paint, made in the proportions as before given, will cover an unpainted pine wood surface of about—

Four square yards (rather more than less).

For second and succeeding coatings, the same work will require less than for first or priming coat; and it is safe to say, that one pound of pure white-lead paint will give four coatings to one square yard of pine wood surface.

(See remarks as to loss by absorption, waste, &c.)

One hundred pounds of pure white-lead paint will cover a surface of—

Four hundred square yards of common machine-planed pine wood, such as is used for out-door finish.

PURE ZINC WHITE.

One pound of pure white zinc paint, mixed in the proportions before given, will cover a surface of unpainted pine wood of more than—

Five square yards—say, five and one-third.

For second and succeeding coats of same work, the quantity required is about 8 per cent. less; so that—

One hundred pounds of pure zinc paint may safely be estimated to cover—

Five hundred and fifty yards of wood surface which has been already painted.

YELLOW OCHRE.

One pound of pure yellow ochre paint, mixed in the proportions before named, will give a first or primary coating, to—

Eight square yards of ordinary pine wood surface. These proportions will apply to the painting of tin roofs; but for such work, the proportion of oil must be less than for wood.

VENETIAN RED.

One pound of pure Venetian red will give a priming coat to about seven square yards of pine wood surface, and a second coating to about eight square yards. The proportion of oil is somewhat less than for yellow ochre. It must be borne in mind, that in earth-paints, the finer the material, the greater will be the quantity of oil required to thin the same to a proper consistency for spreading with a paint brush.

LAMPBLACK OR CARBON BLACK.

One pound of pure carbon black will cover a surface of painted pine wood of—

Sixteen square yards; and this surface, if not subjected to abrasion from mechanical force, or other accident, would remain intact for a century.

FOR PAINTING BRICK WORK.

The experiments in this case were made on a surface of common hard, rough bricks—laid in brown mortar, with wide joints—out of doors, in winter, the atmosphere at a freezing temperature, and with the following results:—

Of pure white-lead, thinned with oil to the same consistency as for the first coating of wood work—

One square yard of rough brick surface requires about one half pound of paint, and but little less for second coat. A third coat, however, requires considerably less, and it will be safe to estimate the quantity necessary to give such work three coats, at one and one-quarter pounds.

For painting a surface of smooth-pressed bricks, laid up with close joints, the quantity required for a given surface will be a little more than for painting new pine wood.

Except in cases where white or very light tints are required, it is not advisable to use white-lead paint for rough brick work.

The ochres, when the same can be either wholly or partially substituted for lead, will be found much more economical and more durable.

Of *pure white zinc*, one square yard of rough brick work requires, for a first coating, about six ounces of thinned paint, or three pounds for eight yards. For second coating, the quantity required is only about four and three-quarter ounces, and for a third coat about four ounces, showing a consumption, for three coats, of about fifteen ounces. So, one hundred pounds of mixed zinc paint will give three coats to more than one hundred square yards of rough brick surface.

Of *pure French yellow ochre*, the quantity required to give a first coat to one square yard of rough brick surface is about the same as for zinc paint, that is, about six ounces; but for second coat, the quantity required is only about three and one-quarter ounces and for third coat about three ounces, showing a consumption of about three-quarters of a pound for three coats to the square yard, or, for one hundred yards, say seventy-five pounds of *pure* yellow ochre paint.

Of *pure Venetian red* for such work the quantities are about the same as yellow ochre and the figures given for that pigment will serve for this.

In painting brick work good results are possible only under certain conditions.

This kind of painting should be done in dry warm weather, when the moisture which bricks absorb from the atmosphere during the winter and spring seasons shall have dried out, otherwise the paint will not adhere tenaciously and will be apt to scale off. In exterior house-painting it is of very great importance that the work be dry when the paint is applied.

The reader will bear in mind the fact, that while the figures for the quantities of the various pigments required to cover a given surface are abstractly considered correct, they being the result of recent and carefully conducted experiments (the figures being rounded to avoid the confusion which might ensue by extending them to the exact number of grains of material actually consumed in the various trials), there are modifying circumstances which

must in the nature of things change the result when the figures are tested on a more extended scale.

A wooden keg, nominally containing twenty-five pounds of white-lead or other paints, really contains but about twenty-three pounds of material, the weight of the package being included. There will be, from absorption and consequent hardening of the paint, an average loss of at least one pound of the contents of the package, so that only about twenty-two pounds will be realized, showing a difference between the nominal and the actual contents of the package of about twelve per cent. In large packages the loss is much less, for the reason that the actual and nominal contents are intended to be the same, and the loss by absorption and its consequent waste is much less in proportion.

The experiments too were made, in every instance, with the very best and purest materials, and under most favorable circumstances, and the same results must not be looked for when the pigments are inferior in quality, and possess far less intrinsic value.

With an apology for the repetition, the writer would again remark that *good results* in painting can only come from the *use* of *good materials.*

CHAPTER XIX.

CHEAPENING OF PAINTS BY ADULTERATION.

The writer proposes to tell fairly, fully and clearly—without fear of contradiction—the whole story of the cheapening of paints by mixing with them certain substances which reduce them rapidly in cost, and still more rapidly in intrinsic value. It must be well understood that in all this mixing, there is no magician's wand by whose potent charm worthless substances can be made to possess a value in themselves! It is, first and last, once and for all, simply keeping out a portion of expensive and worthy material, and substituting therefor a cheap and worthless substance. Sulphate of Baryta-barytes as it is called in commerce —the ready and convenient material whereby the cheapening of paints is made easy—is a hard, brittle, semi-opaque mineral substance, sometimes called Derbyshire spar. It derives its name from a Greek word signifying heavy. When crushed and ground between ponderous burr-millstones, it forms a white, fine powder, and its great specific gravity, and the small quantity of oil required to wet it, fit this substance admirably to serve as an adulterant for paints; and by its use the cheapening of paints is carried on to the last degree.

A story is told of a soi-disant manufacturer, who had emerged from the shell of an unsuccessful dealer in second-hand furniture into the full butterfly-existence of colors and paints. This worthy called one day on a manufacturer of barytes, complaining of the quality of the article he had bought a few days previous. Said he: "I can not make *good white-lead!* and the fault must be in your barytes, for I put *ten pounds of zinc to a hundred of it*, and *that* certainly ought to make *good white-lead.*" Comment is unnecessary!

The claims, too, which these people put forth is still more ludi-

crous. One, pretentiously puts forth his claim to superiority because he puts in the barytes in a way peculiar to himself. Another, that instead of putting the barytes into the zinc or lead, he puts the zinc or lead into the barytes, "which has a *chemical* effect you see." Still another, that, in his just-discovered and known-only-to-himself mode of operation, he runs the millstones so rapidly as to heat the mixture *red-hot*, thereby fusing the lead and barytes, and producing a "homogeneous conglomeration!" Fusing barytes mixed in oil is a good thing! Another claimant for special consideration has discovered a method of preparing linseed-oil, whereby barytes is changed into a substance which possesses all the good qualities of pure white-lead, and some that the latter substance does not possess.

These stories are all alike reasonable, and are all entitled to the same amount of credit. No preparation of oil or manipulation can alter in any degree the nature of the materials which are put into it. The products are simple mechanical mixtures, and are valuable or worthless just in proportion as they contain more or less of the material under the name of which they may be offered for sale. Thus, step by step the process of cheapening has gone on until in a degree the evil has proved its own remedy, and the demand is every day becoming more and more emphatic for pure colors, which are sold in the name and under the guarantee of respectable and responsible manufacturers.

But it must not be supposed that the extreme point to which adulteration has been carried in the cheapening of paints has been voluntary on the part of manufacturers.

When dealers and jobbers in white-lead and paints, as well as retailers thereof, discovered the fact that white-lead, zinc, and other pigments could be extremely cheapened without changing the quality, *so far as the eye alone could detect*, a demand arose for cheap and cheaper goods, and manufacturers were, of course, in self-protection, compelled to comply with these demands. The inordinate profits on such goods—if any there were—did not accrue to the producer, but to those who sold them for what they were not. The percentage of profits on these fictitious paints was and is the same as on those articles which are in reality what

they purport to be, so far as the producer is concerned; nor does he—I speak now of established and responsible manufacturers—practice any deception in the matter. The dealer fixes the price simply, and the manufacturer makes the goods to suit.

The views of the writer on the question of true economy in the use of paints, have been elsewhere in these pages so fully set forth, that it seems hardly necessary to repeat them here. Yet so important is this matter of economy, that, even at the risk of repetition, what are esteemed the main points will be again briefly considered.

Firstly. The operation of painting houses, fences, barns and out-buildings is necessarily attended with considerable expense. Painting is done mainly with a view to improve appearances; to render the dwelling and its surroundings or connections more comely and pleasing to look upon. Not so much either for the owner's particular gratification as to present a good face to the public.

As has been before remarked, a structure which is *worth* painting, is worth painting with some regard to harmony and the fitness of things.

To cover exterior surfaces with a dirty-brown earth, mixed in skimmed milk, may, in the judgment of some over-economical proprietors, serve to keep up appearances; but it is in all kindness suggested that such a compromise is not "better than nothing." Rather leave the painting to nature and time. These will kindly stain the wood with a tone of color which will far better accord with the general landscape, than the cheap and nasty dirty-brown apology for paint. Such efforts have altogether too much of the "skim milk" character about them.

In painting as in most other material operations of every-day life, to use a homely but expressive saying, "You can't have your cake and eat it too." It is said that "every thing is worth just what it costs." To phrase it differently: What costs nothing is worth just what it costs; and this will be the experience of every owner who expects to attain desirable results in the beautifying of his home at a very small cost. The rule in such matters should be to attain the object which prompts us to act first and always;

next, to attain this at the smallest possible cost, always keeping in view the question of durability; and this view of the case opens up again the whole question of how to paint, and what to paint with.

If white be a *sine qua non* with a proprietor about to paint his domicile, there is an end to argument. Let him obtain the best possible white-lead or zinc. If those tones and shades of color which the ochre and earth-paints present, either by themselves or modified and changed by admixture with white, be desirable, or not objectionable, there is a chance for the exercise of judicious economy. Dark colors, as a rule, are less expensive than lighter colors; but colors which are by themselves dark in shade may be made to present to the eye an appearance of very much lighter colors than they really are, by the skillful contrast with much darker colors.

Drabs, grays, clay-colors, stone-colors, red and yellow, orange and browns may—even when the shade of these colors are dark rather than light—be made to appear on the exterior surface of a building much lighter in tone than they really are, by painting the trimmings, *i. e.*, window and door frames, corner boards, cornices, &c., a much darker color; and the more of the natural or earthy substance (which gives the tint) that can be used the more economical will be the paint, for the reason that a given quantity by weight of the earth-paints will cover a much larger surface than the same quantity of lead paint. The earth-paints, too, are much more durable than lead paint, and serve much better in protecting the wood from the influence of the sun's rays and the action of the elements. The result is what must be looked to; and to obtain the desired result with the least expenditure of time and money is true economy.

As a rule it is safe to distrust the professions of those who claim to give a pure article of paint for a less price than the current market value of such article. The receipt of circulars and prices-current, issued by some pretentious Anglo-Norman Color Company, incorporated, &c., is a matter of every day occurrence among dealers and consumers of paints. These prices-current are somewhat in form and substance as follows:—

Nor. Col. Co.'s Pure White Lead, per lb	14c.
Mixer & Co.'s " " " very superior, per lb	12c.
Lyre Brand, " " " unequaled for body and whiteness	10c.
London " " " (This lead will be found in density and covering property unsurpassed by any brand in market,) per lb	8c.
Ne plus ultra brand	7c.

NOTE.—The latter named brand of pure white-lead is recommended to the trade as the best paint ever offered. It produces a beautiful snow-white finish, &c., &c.

Such advertisements partake rather too much of the nature of gift enterprises, or lotteries, where a prize worth at least double the amount expended is guaranteed to the ticket-holder. On the principle that "good wine needs no bush," it will be seen that the article in the above list which *may* be unadulterated, is qualified by the simple adjective "*pure*," while those which are, by the figures which follow, confessedly impure, require a great number of qualifying words to set forth their superiority. There can be no better rule for consumers of paint to adopt than to buy of well known, responsible manufacturers, and to buy such paints *always* as will realize the desired result with the least expenditure of means. Beware of unreasonable promises.

The writer will be pleased to confer with persons who, by reason of their remoteness from the populous centers, and consequent inability to obtain the services of skilled workmen, may require advice or suggestions in the matter of external decorative house-painting, with a view to the harmonious arrangement of tints, and strict economy in the selection of materials. Apply, either by letter or personally, at 111 Fulton Street, New York.

THE END.

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